PEST CONTROL

JANUARY 1951

EVERY MONTH SINCE 1933

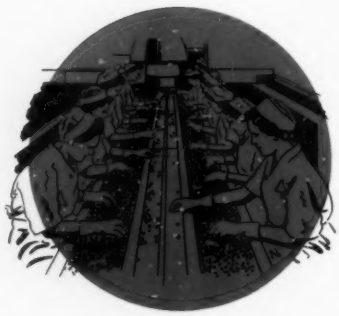
Safety's
TEN COMMANDMENTS
1 Keep your mind on the job
2 Wear your safety equipment
3 Report unsafe conditions
4 Use guards as intended
5 Heed safety rules and signs
6 Stay clear of moving machinery
7 Get first aid promptly
8 Use the right tool for the job
9 Eliminate fire hazards
10 Keep things shipshape for safety
GREEN CROSS FOR SAFETY
Note to reader:
Add your own.

Maybe suggestions on page 40 will help you add to those of the National Safety Council.

MAGAZINE OF THE PEST CONTROL
AND ALLIED SANITATION SERVICE INDUSTRIES

for fast knockdown and kill

WAREHOUSE



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- Rust red beetles
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- Saw-toothed grain beetles
- Spider beetles
- Angoumois grain beetles
- Mediterranean flour moths
- Meal worms
- Cigarette beetles
- Drugstore beetles
- Grain mites

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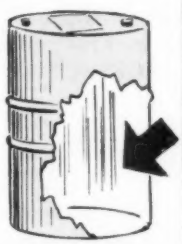

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Which Ones?

When it comes to deciding which of the increasing number of pest control meetings one should attend, you may wonder just what the advantages of each are.

The limited number of days and dollars PCOs can spend for these conferences emphasizes the need for defining the purposes and goals of each. Local groups, with cooperation from the National Pest Control Association, spend a great deal of time in their preparation.

City and state meetings are programmed to help PCOs in their particular areas solve business and control questions that have come up between sessions.

Regional conferences held on the campuses of cooperating universities offer the best answers to technical control problems. It would be a waste of excellent educational facilities, both in trained university personnel and in laboratory equipment, to include in the regular program of such conferences subjects other than those which can utilize the opportunities provided by the institution.

National conventions bring together prominent speakers to discuss industry developments of the preceding year. Business procedures affecting PCOs generally are offered, and an outlook for the coming year is provided. NPCA committees report the work they have accomplished and suppliers use this occasion to exhibit their lines.

Attend those meetings nearest you more often. Your support will enable them to serve you better.

James A. Nelson

Editor

PEST CONTROL

EVERY MONTH SINCE 1933

JAMES A. NELSON
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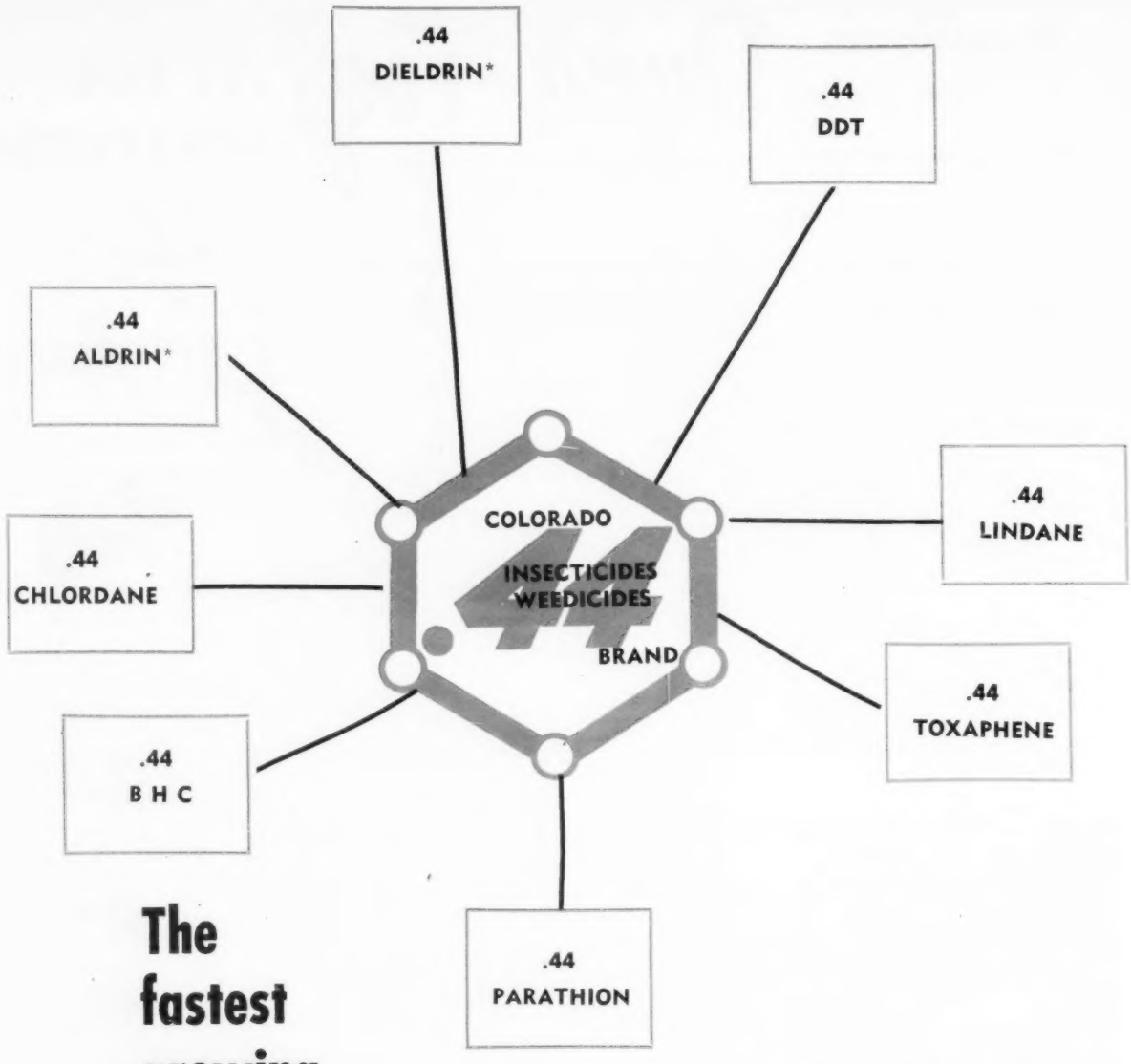

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* Toxicity tests are being completed and Dieldrin and Aldrin will soon be available.

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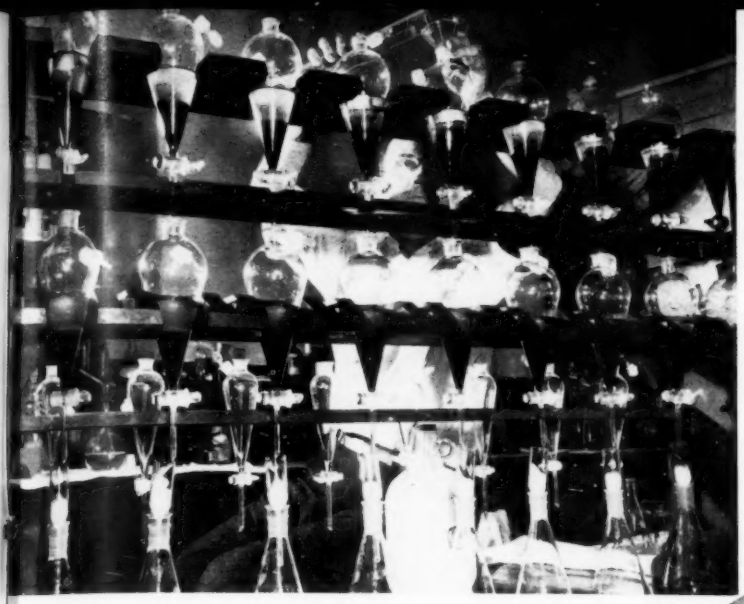


H. D. Mann of the Insecticide Division of the Bureau of Entomology & Plant Quarantine carrying on an extraction in the analysis of milk from cows fed on hay treated with insecticides.

USING INSECTICIDES Safely

by

Dr. Fred C. Bishopp

Assistant Chief
Bureau of Entomology & Plant Quarantine
U. S. Department of Agriculture

An Address Given by Dr. Bishopp at NPCA Convention, October, 1950

THE PUBLIC appears to be becoming very sensitive to hazards connected with the use of insecticides. That there are hazards can not be denied. So there are when one crosses a busy street. The main point is that such hazards be recognized, understood and evaluated. We don't want to be kept from crossing the street, neither do we want to be struck by an automobile, trip on broken pavement or fall into an open manhole.

If we are alert to these hazards, accidents can be avoided. On the other hand, if we fail to remove hazards that are susceptible to removal, continue to ignore all safety precautions and to have accident after accident at the same place, we may be prevented from crossing the street at all or be eliminated by being killed. Now, it is distinctly worse if our carelessness leads others to be hurt and such tendencies are more likely to lead to severe restrictive laws and regulations, and rightfully so.

In the operations which you carry on, you and your employees are not only exposed to numerous hazards but you may be exposing your clients and others to similar ones. You have important responsibilities to meet in rendering service to the public. Your services are being sought for the control of insects on an ever-expanding front — species that annoy or spread disease to man or his pets, contaminate or destroy his food, or damage his possessions made of many different kinds of natural fibers and other materials. As pest control operators you must not only be able to recognize and know how to control these formidable pests but you must be able to accomplish the job without damaging property or endangering life.

Stress Sanitation, Prevention

Sanitation and other preventive measures should be stressed at all times by those charged with entomological control work. It is realized, however, that preventative recommendations are seldom a part of the control program of the average operator. This may be because he is unfamiliar with the value of such an approach or that he fears it will hurt future business, particularly if the client is unresponsive and indicates that he has hired the operator to "kill bugs". Although sanitation and other non-chemical methods are of great importance in many pest control situations, unquestionably most operators place the greatest reliance on the use of insecticides.

In years past the number of insecticides available for a particular job was relatively small and it did not take very long to become familiar with the ways in which they could be used to control pests and yet not be a great hazard to the operator during application or to those who might come in contact with the residues later.

In recent times many of the older insecticides are giving ground to new ones, a number of which are extremely poisonous and require greater exactitude in application. Some of these insecticides will control insects far better than the older insecticides, therefore it is essential that the pest control operator become familiar with their qualities and methods of dispersing them that

will insure good insect control but no hazard to the operator or to other interests.

The effectiveness of some of these newer insecticides and improved methods of applying them have tended to lessen the use of fumigants and thereby remove some of the hazards from acute poisoning that previously confronted the pest control operator. In many cases fumigation is still a necessary tool with which the operator must work. In this brief discussion of hazards, time will not permit the inclusion of fumigants and the safety measures that should be taken in their use.

I cannot refrain, however, from calling attention to the need for utmost care in the use of all materials commonly used as fumigants. Some operators are extremely careful with the use of cyanide fumigants because they know of their quick and deadly action, but are much more careless in handling such materials as carbon disulfide, carbon tetrachloride and methyl bromide.

It is needless to point out to you the far-reaching adverse effects of such occurrences on those in any way connected with pest control work. It is only by greater knowledge of fumigants, insecticides, and repellents and how to use them that you can expect to do effective work and avoid accidents. Not only should you, as PCOs, have more accurate information but there is need for the public in general to become familiar with insecticides and how to avoid accidents. There is also need for the public to be better informed on hazards connected with the use of insecticides. At present some people are unnecessarily concerned with the dangers attendant upon the use of insecticides and others are unduly careless.

Comparative Toxicity

A large number of the relatively new insecticides fall into two groups, the organic phosphates and the chlorinated hydrocarbons. The organic phosphates, such as parathion and tetraethyl pyrophosphate, are extremely dangerous from the standpoint of acute toxicity. On the other hand, these materials are quite volatile or hydrolyze readily, hence they are particularly dangerous from the viewpoint of residues. The chlorinated hydrocarbons, such as DDT, TDE, methoxychlor, benzene hexachloride, lindane, chlordane, aldrin and dieldrin, on the other hand, are noted for their persistence and of course this stability means an increased hazard through residues on food or on treated products. In addition, it has been demonstrated that some are accumulative in action and may be stored in the fat or in other tissues of the body, since these materials may gain entrance to the body by skin contact, by breathing or by being swallowed. All of these avenues of ingress must be watched by operators who are themselves exposed to accumulative poisons day after day for long periods.

In order to appraise the toxicity of insecticides considerable experimentation is carried out on animals such as mice, rats, rabbits, dogs, and monkeys, as well as livestock, and the results are translated to a large degree by analogy to man.

The comparative poisonousness of materials is usually based on acute oral toxicity, the toxicity by skin application and the chronic effect. Dr. A. J. Lehman of the Food and Drug Administration has published comparative data on a number of the newer insecticides based largely on small animal experiments.

Dr. Lehman (1948) has stated the mean lethal dose of DDT orally is 250 mg. per kg. The acute oral toxicity of some of the other commonly used insecticides when compared with DDT with a ratio of 1 is as follows: Parathion 70, nicotine 25, rotenone 4, toxaphene 4, lindane 2, chlordane ½, pyrethrins 1/16, methoxychlor 1/24.

Some comparison of hazards in connection with the use of a number of the common insecticides is given by Dr. Lehman (1950) as follows:

DDT
Potential hazard of DDT may have been underestimated because
- a. At very low levels of feeding there is
  1. Storage
  2. Definite though minimal liver damage
- b. Elimination is slow
- c. Milk can become contaminated as the result of barn spraying
- d. Has been found in human milk
- e. Is deposited in human fat

Chlordane
Presents the greatest all-around hazards of the commonly used chlorinated insecticides and therefore
- a. Has no place as a contaminant of foods
- b. Household use should be strictly limited

Lindane
Has about ¼ the hazard of DDT because of
- a. Minimal storage
- b. Rapid elimination
- c. Less tissue damage

Toxaphene
Lack of adequate method for micro determination in biological material handicaps final appraisal

Methoxychlor
One of the safest of insecticides because of
- a. Little or no effects at high levels of chronic feeding
- b. Little or no storage in fat

Dieldrin
About 10 times more poisonous by dermal than by oral route. Chronic effects not known at present but appear to be like chlordane

Aldrin
Same as for dieldrin

Rotenone
Chronic effects appear to be less than first anticipated; residue hazard may be less

Pyrethrins
Among the safest of insecticides. Toxicological hazards under conditions of use extremely remote

Allethrin
Evidence at present indicates similar toxicity to that of pyrethrins

Piperonyl butoxide, N-propyl isome, Octacide 264
These activators have such a low order of toxicity as to be considered as presenting little or no hazard under ordinary conditions of use

Few Cases of Poisoning — Although there are few authentic cases of any ill effects from the use of insecticides as recommended by Federal and State authorities, there are a number of reports of illness and a few deaths chargeable to the pesticides. Careful checks on men who have worked extensively with the newer insecticides, such as DDT, have not disclosed any evidence of chronic poisoning but this possibility through careless exposure should not be lost sight of. Many reports of ill effects have proved erroneous, but it is our responsibility to reduce, by example and teaching, cases of accidental poisoning by pesticides, and thus remove any basis for criticism.

Precautions Suggested

It is difficult to lay down hard-and-fast rules for the safe handling, storage, and use of all insecticides that may be used in pest control. The same set of precau-

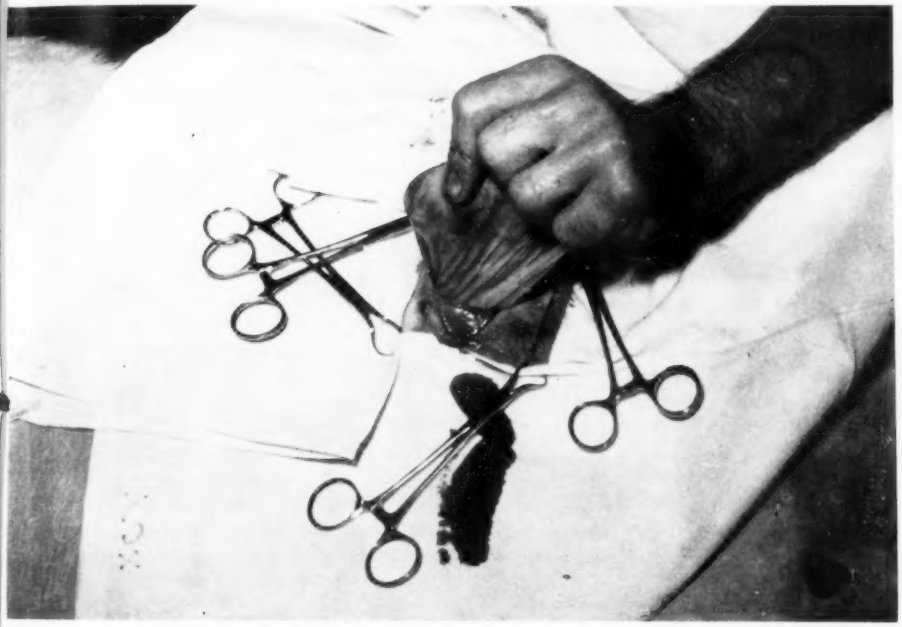
tions are not applicable to all materials or all conditions. However, all insecticides should be stored out of the reach of children and where they will not be accidentally used as baking powder or other food materials. When mixing and applying insecticides it is a good plan to consider all of them as poisonous.

Solvents—A number of different solvents are being used in the preparation of insecticide solutions and emulsions. Xylene, alkylated napthalenes, fuel oil, and kerosene are most commonly employed. Each of these solvents has some toxicity, and some of the reported ill effects of DDT are clearly chargeable to the solvents.

Xylene and some other volatile solvents are inflammable, and breathing the fumes may cause headache and nausea. Some of these materials cause the skin to become dry and crack. Some of the alkylated naphthalenes may irritate the skin and even cause severe dermatitis, especially when the sensitized skin is exposed to the sun.

DDT—Emulsions and solutions of DDT in concentrated form which come in contact with the hands or body should be removed immediately with soap and water. Dilute solutions, emulsions, and wettable - powder preparations should not be left long in continuous contact with the skin. Emulsions often contain xylene as the solvent. When mixing emulsions rubber gloves should be worn to protect the hands, and prolonged breathing of the vapors should be avoided.

Indoor spraying with emulsion sprays containing xylene should be done in well-ventilated rooms. During the spraying the eyes should be protected with goggles, and it is advisable to wear a respirator and make frequent changes of filter pads.



Sample fat from steer is taken for analysis. Required surgery is harmless.

Tables and shelves where food is placed, as well as baby beds and children's toys, should be completely covered or removed from the room while it is being sprayed. Foods and utensils should be well protected from the spray.

DDT should not be applied to cats or dairy animals. In fact, full authoritative information should be obtained before any insecticide is used on pets or livestock of any kind.

Insecticidal mists or fogs when properly applied are less likely to leave appreciable residues on gardens than are sprays. However, they leave little residue on ceilings and walls. Questions have been raised as to the hazard of breathing such fogs. There is no indication that breathing them for a short time will produce ill effects, but day after day exposure should be avoided.

Remnants of spray from tanks and the washings from spray equipment should be drained into a hole in the earth or in places where they will not gain access to streams and ponds. Insecticides should never be mixed on or near wells.

Toxaphene, TDE, Methoxychlor, Benzene Hexachloride, Lindane, and Chlordane — The same general precautions should be followed in handling each of these chlorinated hydrocarbon insecticides. Methoxychlor and TDE are less toxic than DDT to warm-blooded animals from both acute and chronic standpoints. Toxaphene, chlordane, and lindane have much greater toxicity than DDT when absorbed through the skin. Moreover, toxaphene is particularly poisonous to fish. TDE, on the other hand, appears to be considerably less toxic to fish than DDT or any of the other chlorinated hydrocarbon insecticides in the above heading. Benzene hexachloride, lindane, and chlordane have a fumigating effect, and it is conceivable that in confined spaces the fumes may produce ill effects. For this reason the application of these materials to the entire interiors of houses or other buildings where people are exposed continuously may be inadvisable. This is especially true of chlordane which is recommended only as a spot treatment in buildings.

Parathion and Other Phosphorous Compounds—These materials are so highly poisonous that they should not be used in spraying buildings. They have been successfully employed as liquified gas aerosols in greenhouses for the control of plant pests. They are highly effective against many pests but have little residual action. If used at all in buildings they should be applied as in greenhouses. In such cases they are treated with all the precautions required in hydrocyanic acid gas fumigations.

Respirators with special canisters for parathion must be used when that insecticide is being employed.

In the case of suspected poisoning from any insecticide, a physician should be called immediately.

However, in view of the newness of this group of insecticides, physicians may not be aware of the antidotes recommended. Hence the following information is presented:

Antidotes

There is no specific antidote for accidental poisoning by DDT and other chlorinated hydrocarbon insecticides, although phenobarbital has been found to allay the tremors in animals resulting from such poisoning. The usual procedure of emptying the stomach with emetics, or better, stomach pump, is indicated in cases where these insecticides are swallowed.

Atropine is the antidote usually advised for parathion poisoning. *Morphine should never be given.*

Legislative Controls

Everyone admits that certain laws and regulations relating to economic poisons are necessary. It seems to be the general feeling, however, that it is best to hold such regulatory legislation to a minimum and for industry to police itself.

As stated at the beginning of this talk, there is a feeling of anxiety developing with reference to the widespread use of insecticides. Some of this anxiety may be justified because of the several accidents due to carelessness or poor judgment, which have occurred in the last couple of years.

Evidence of the extent of this feeling of anxiety is manifest in the holding by the Food and Drug Administration of the hearing on chemical residues on fresh fruits and vegetables, the passage of the Sabath resolution providing for a congressional investigation of food contaminants, and the advocacy of control legislation in several States. It is true that most of these demands and inquiries relate to the agricultural uses of pesticides, nevertheless they do involve pest control operators to a considerable extent.

Certainly PCOs should be familiar with these activities and through their intelligent use of economic poisons they can do much to allay the fears now being expressed by the public.

Residue Tolerance Hearing — The Federal Food, Drug, and Cosmetic Act of 1938 does not preclude the use of insecticides but it does make provisions to guarantee that when they must be used consumer safety shall be assured. It is recognized that humans are exposed to traces of toxic substances from many sources, therefore, foods are considered adulterated if they bear or contain any poisonous substances which may cause them to be injurious to health. According to the law, any poisonous or deleterious substance added to food shall be considered unsafe but, since this would forbid the use of necessary insecticides, an exception was made where it can be shown that the use of poisonous material is required in production or cannot be avoided in good manufacturing practice. Under these circumstances, the Administrator promulgates regulations setting safe tolerances that have the force and effect of law. Public hearings must be held in order to establish tolerances. Such a hearing was held in 1944 to set a tolerance for fluorides on apples and pears but this was invalidated later. At the present time the public interest is safeguarded by the enforcement of informal tolerances.

On January 17, 1950 a public hearing was called by the Food and Drug Administration to consider proposals to issue regulations limiting the quantity of poisonous or deleterious residues remaining on or in fresh fruits or fresh vegetables from substances used to control insect pests and plant diseases. Evidence was taken in 5 parts: (1) testimony regarding the necessity for using added substances for controlling enemies which interfere with the production of fresh fruits and vegetables; (2) whether the substances so required are poisonous or deleterious and for which ones must tolerances be established; (3) amounts of these substances received from all sources by consumers; (4) toxicity of the substances for which limits are to be established; and (5) testimony on amending the regulation that established the fluorine tolerance, and other evidence considered relevant to the hearing. Part 3 — amounts of poisonous substances received from all sources by consumers — has a very direct bearing on the operations of pest control operators as is at once evident.

The hearing was closed on September 15, 1950 after meeting for 82 days. It is estimated that 225 different witnesses appeared who established an imposing record of 9,000 pages of testimony, bolstered by about 1,300 exhibits. The use of perhaps 150 chemicals for the control of several hundred insects and diseases on fruits and vegetables are a part of the record. Participants in the hearing praised the manner in which it was conducted and feel that an honest effort was made by all to include relevant facts in the record to serve as a basis for the establishment of fair tolerances on materials considered detrimental to man. The record is voluminous, therefore, it is unlikely that regulations establishing tolerances will be made effective before the end of 1951.

Sabath Resolution and Delaney Committee—In 1949 two substantially identical resolutions were introduced in the U. S. House of Representatives, one by Congressman Keefe of Wisconsin (H. R. 207) and one by Congressman Sabath of Illinois (H. R. 323). The Sabath resolution was passed last summer. In compliance with that resolution, the following select committee of seven Members of the House of Representatives was appointed by the Speaker: J. J. Delaney (New York), chairman; F. B. Keefe (Wisconsin); A. L. Miller (Nebraska); T. G. Abernethy (Mississippi); E. H. Hedrick (West Virginia); G. L. McDonough (California); and P. C. Jones (Missouri). Under the coverage of this resolution, the committee is directed, among other things, to conduct a full and complete investigation of "(1) the nature, extent, and effect of the use of chemicals, compounds, and synthetics in the production, processing, preparation, and packaging of food products to determine the effect of the use of such chemicals, compounds, and synthetics (A) upon the health and welfare of the nation and (B) upon the stability and well-being of our agricultural economy;" and "(2) the nature, extent, and effect of the use of pesticides and insecticides with respect to food and food products, particularly the

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effect of such use of pesticides and insecticides upon the health and welfare of the consumer by reason of toxic residues remaining on such food and food products as a result of such use." The committee is charged to report the results of its study to the House, together with such recommendations for legislation as seem advisable.

In September 1950, the committee began hearings in the Old House Office Building. Several experts in the fields of toxicology, pharmacology, medicine and nutrition from State universities and Federal agencies have already presented testimony, and many other specialists are expected to testify when the committee resumes its hearing, which will probably be soon after Congress reconvenes.

The Bureau of Entomology and Plant Quarantine and several other Bureaus of the Department of Agriculture have been requested to submit information to the committee on the effect of chemical usage upon our agricultural economy. The committee has requested the department to have subject-matter specialists appear before it to discuss the many important ramifications of the resolution.

Are More Laws Necessary?

In addition to the protection of our foods provided by the Food and Drug Administration, the Federal Trade Commission and other agencies, the Insecticide Division of the Production and Marketing Administration of the U. S. Department of Agriculture under the Insecticide and Fungicide Act is providing protection to pest control operators and the public through insistence by the enforcement officers of full and proper labeling of pesticides. The labels not only indicate chemical make-up of the materials but provide information on their safe and effective use.

Some State and city laws are in effect designed to protect users of pesticides and the public, but other States have no legislation controlling pesticides sold intrastate. Such legislation in other States if sensibly and uniformly drawn would doubtless be desirable. It would be unfortunate, however, if additional, ill-conceived and unnecessary laws are passed.

The present close cooperation of the several city, State and Federal agencies and the various industry groups including your own, in the development and use of pesticides and equipment for their application, is providing the very best assurance of adequate protection of all public interests.

Let us, by research and observation, make 1951 a year for the acquisition of more exact and general knowledge of pesticides, and above all let us make it a year free from accidents both among our operators and our clients.

Steel Wool & Cement For Rats

Stainless steel wool loaded with a batter of cement mortar will result in a wall of "reinforced concrete" when used to plug large rat holes, according to Philip Mayer, Jr., of Woodside, L. I.

Mr. Mayer originally suggested using rust-free stainless instead of ordinary steel wool to plug rat holes and just recently discovered the added value of using cement-filled steel wool for larger holes.

Fla. Civic Campaigns May Be In Violation Of The Law

A recent Service Letter of the Florida Pest Control Association revealed that at least one of the state's cities carried out a civic-group-organized pest control program last summer, charging a fee of between $6 and $7 per job. Chemicals were purchased and paid for by the civic group, equipment was borrowed from governmental agencies, and an advertising campaign in newspapers advised the community of the availability of such services as interior spraying of homes for general insect control as well as dusting of yards and lawns. Work was performed by members of the civic club. The Florida State Board of Health has stated that in their opinion a program of this type would be in violation of the Structural Pest Control Act if such organizations would charge people for performing any type of structural pest control work.

Industry members in Florida are urged to notify the Florida Pest Control Association, 2001 W. Platt St., Tampa 6, if similar programs come to their attention.

12 Check Points for Vehicle Safety

Go Over Them Once a Week

Courtesy of C. H. Beal, Safety Director, Orkin Exterminating Co., Atlanta, Georgia

Brakes Do they need adjustment? Does the handbrake work?

Lights Do any bulbs need replacing? Are headlights properly focused and aimed? Are the reflectors clean? Are tail and stop lights in good condition?

Tires Are they all in safe condition? (Consider cuts, fabric breaks and excessive wear). Do you see that they are properly inflated for their maximum length of service and for safe driving? **A blow-out may be fatal.**

Windshield Wipers Do they operate satisfactorily? Do blades need replacing? **Good visibility is essential.**

Horn Does it operate easily, and when you need it?

Rear View Mirror Is this mirror broken or defective in any other way to reduce visibility?

Muffler. Is your muffler in good order? In the winter when your windows are closed, a defective muffler will emit monoxide gas that **may prove fatal** to a driver.

Steering Gear Do you have your steering assembly checked periodically? A worn out or defective part in this assembly may cause a serious accident.

Lubrication Is your car or truck periodically lubricated? Remember, proper lubrication keeps the vehicle operating correctly and economically, lengthens the life of the vehicle and contributes to its safe operating condition.

Battery Do you have your battery checked regularly? **It costs nothing to have battery checked and water added.**

Appearance Do you keep your vehicle looking clean and neat? An operator and his company are partially judged by the appearance of your vehicle.

Antifreeze Be sure not to use the "outlawed" chloride solutions.

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CARPET BEETLES
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by

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Theodore Meyer Estate
Philadelphia, Pa.

LIKE *Anthrenus scrophulariae*, *Anthrenus verbasci* is also called the "Buffalo Moth". That is why common names are so confusing. The other name for *A. verbasci* is the "Varied Carpet Beetle".

Description:

The size of the adult of *A. verbasci* is variable, being about 1/15th inch to 1/8th inch long and from 1/22nd inch to 1/11th inch wide. The body is broadly oval and strongly convex, being wider than it is high. The cuticle is reddish brown to black. The scales on the upper surface are dark brown to black except as follows: 1. head almost entirely yellowish; 2. part of pronotum, lateral third of base and all of extreme sides with white scales, the margins of these white patches usually being surrounded by yellowish scales; and 3. front wings (elytra) with three more or less zig-zag lines of white across the back, the white lines usually being margined with yellowish scales. Ventral surface predominately white or yellowish white. Antennae 11 segmented and club 3 segmented.

Eight recognized variations have been described. These are based mainly on the scale pattern and to some extent on the shape and size of the body.

The Varied Carpet Beetle, like the other three species of Carpet Beetles under consideration, is cosmopolitan. The Varied Carpet Beetle is confined to the temperate region.

The adults are readily attracted to flowers and some observations show that there is a preference to those of light blue color. The order in which they are attracted is as follows: pale blue, white, yellow, green, orange, violet, red, indigo, black.

Life History:

Eggs are usually laid in the Spring or early Summer. Oviposition takes place about two weeks after emergence from the pupal skin and lasts from one to two weeks. Each female will lay from 20 to 100 eggs, on or near the larval food. The eggs hatch in from 7 to 18 days.

Outdoors, the insects spend the winter in the larval stage, completing their growth the following year. The usual time for larval growth is from 222 to 323 days. Some larvae have taken much longer to develop.

Pupation of *A. verbasci* takes place in the last larval skin and on the larval food. For instance, when the insect has been eating-on other insects, pupation takes place within the skin of the eaten insect. After becoming an adult, the insect remains in the pupal skin for from 4 to 8 days before becoming active. The total adult life is from 9 to 44 days, including the quiet period spent in the pupal skin.

The total life of the species is about a year, depending on the temperature at which the larvae lived and the food it ate. Some have been known to take as high as 657 days to reach the adult stage. Again, it is impossible to be too specific because the larval food has a great bearing on the length of time it takes the larva to mature, and heated houses produce a semi-tropical climate, so any statement of time for the life cycle is only an estimate. This is true of all the Carpet Beetles.

The food of this insect is approximately the same as the other species described here, except that the larvae of *A. verbasci* seem to prefer dead insects to wool when it has a choice. However, it will not spurn animal substance as food, and so it has taken its toll in damage to fur, feathers, wool, bristles, horn skin, hides, leather and hair.

Unlike other species of the Genus *Anthrenus*, *A. verbasci* can develop normally on plant foods alone. Hence, it has been found in drugs, cayenne pepper, belladonna leaves, flour middlings, peanuts, peanut meal, cakes and wheat. One culture was kept successfully in a jar containing two ears of maize for a period of seventeen years.

Where the other species of Carpet Beetles seem to need animal protein as the principal diet, and other foods as a supplementary diet, *A. verbasci* reverses this procedure by preferring the supplementary diet to the primary one.

Description of Larvae

I have kept the description of the various larvae to the last, so they can be placed together for the sake of comparison.

Black Carpet Beetle:

The newly hatched larva of the Black Carpet Beetle is slender, about 1 mm. long. At first, the body is pale cream, but it soon takes on a yellower color. The legs are about the same color of the body; the head slightly darker.

The mandibles are brown and conspicuous. A brush of hairs, about 1 mm. long extends from the caudal end of the body. Other shorter hairs project from the sides. Some of these are 0.2 mm. long. Still shorter hairs extend from one body segment to the next body segment. These hairs are present on the dorsal, ventral and sides of the larva's body. Very short hairs project from the head. All of these hairs are pale yellow and those at the end of the body are the only ones which can be seen by the eye without the aid of a microscope. The body is widest just back of the head. The larva does not change in appearance as it grows, except to become larger. When mature, the larva is 7 to 8 mms. long. (A mm. is about 1/25th inch). As it matures, the larva becomes a golden brown to a brown color.

Buffalo Moths:

The mature larva of the Buffalo Moth or Old Fashioned Carpet beetle *(Anthrenus scrophulariae)* is a rich, reddish brown color, clothed with stiff black or dark brown hairs which are more numerous around the sides and at the ends of the body than at the back. The larvae are quick and very active, appearing to run rather than crawl. Each tergite bears two rows of hairs, stouter

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scaled bristles forming the interior row and barbed body hairs forming the broader posterior row. On the last three body segments the posterior row is usually not very distinct. Each segment bears two or more long hairs which extend beyond the others on either side of the body. The fifth, sixth and seventh abdominal segment each bears, laterally at its caudal margin, two brushes of barbed hairs which extend upward and backward in compact tufts to meet above the body. The caudal brush, consisting of twenty or more scaled hairs about equal in length to the larva, is borne on the eighth, or last, abdominal segment. The sternites of the abdomen are less heavily pigmented than are the tergites and the ventral surface of the thorax is almost white. The cephalic margin of the first thoracic segment bears a row of forward projecting bristles which form a collar about the larva's head. The head itself is enclosed with short bristles. Ocelli are borne on the head, on the sides, back of, and a little above the antennae. The mandibles are short and heavy. The body is widest from the last thoracic to the fifth abdominal segment, and tapers off to both ends. Mature larvae measure from 2.5 to 3.5 mms. (about 1/8 inch) long.

Furniture Carpet Beetle:

The larva of the Furniture Carpet Beetle, *Anthrenus vorax* is so similar to *A. scrophulariae* that it is difficult to separate the species in the larval stage. The larvae of these two species differ from those of *A. verbasci* in several ways, particularly in the shape and color of the body, and in the number, color and length of the body hairs.

The full grown larva of *A. vorax* is generally chestnut brown in color. The larva measures about 1/4 inch in length and a little less than 1/8th inch across the widest part of the body. The dorsal surface of the thorax and the abdomen are covered with long, dark brown or almost black hairs, which give the larva a fuzzy appearance. The hairs on the head are short and stiff. On the anterior margin of the prothorax there is a row of somewhat longer hairs which project forward and encircle the head. Farther back on the prothorax there is a second, but somewhat more irregular, row of hairs. Each succeeding segment has a nearly straight row of similar hairs, those on the tergites and those on the pleurites being much longer than those on the sternites. On each side of the larva tufts of long hairs project backward from just under the caudal margins of the fifth, sixth, and seventh abdominal tergites. Normally these hairs are held as compact brushes which are raised at a slight angle over the posterior end of the abdomen. When the larva is disturbed, each tuft stands upright and spreads out like a fan. Extending backward from the last abdominal segment there is a long pencil of hairs which vibrates rapidly as the larva moves about. The body hairs are much in evidence just after a moult, but as the larva crawls around many of the hairs are rubbed off. This is especially true of the long ones. Hence, a larva which is ready to moult or pupate is practically devoid of hair.

Pupation takes place in the last larval skin.

Varied Carpet Beetle:

The mature larvae of the Varied Carpet Beetle, *Anthrenus verbasci* vary considerably in size. Usually, however, they are from 4 to 5 mms. long, or about 1/5th inch. The body is widest at about the fourth abdominal segment and tapers gradually towards the head. On the dorsal surface the body segments are brown and sclerotized. The posterior third of each thoracic tergite is lighter than the anterior two-thirds. Beginning with the fifth abdominal segment, the tergite of the posterior part of the abdomen are much darker than those of the anterior part. The conjunctiva between the segments is pale tan in color. Thus the back of the larva's body appears to be made up of a series of light and dark brown transverse stripes. The sternites are pale pinkish tan and not sclerotized. The legs are light brown. The head, which is about half as wide as the fourth abdominal segment, is covered with stiff, reddish brown hairs. The mandibles are black and conspicuous, while the pale antennae are difficult to see.

The anterior margin of the first thoracic tergite bears a row of stiff brown hairs that project forward over the back of the larva's head. On the second and third thoracic tergites, and on all of the abdominal tergites, there are single transverse rows of stiff, upright brown hairs. The hairs at the ends of the rows are longest and project to right and left from the sides of the larva's body. Just under the caudal margin and at each side of the fifth, sixth and seventh abdominal tergites, there is a thick tuft of hairs. When the larva is quietly feeding, these tufts lie almost flat on its body and extend backward covering the posterior abdominal tergites. If the larva is disturbed these tufts are at once raised and opened up, first as fans and then spread out to form rosettes. Extending backward from the last abdominal segment are a few (generally five or six) very long hairs. On the ventral surface of the abdomen are many soft, short, brown hairs that lie almost flat on the body. The larvae of this species retain their hair much better than the last two species, so do not become so bald just before moulting.

Pupation takes place in the last larval skin.

Larval Stage Long

The same can be said of the Carpet Beetles that is true of so many insects; that the larval period is a storing up period, a time to acquire strength and fat for the all important job of mating and laying eggs and so carrying on the future existence of the species. The larval stage is thus relatively long in proportion to that of the adult.

It seems reasonable to assume that the natural food of the larva of all four species is dried animal matter, rather than fresh carcasses, and so they are not in competition with other scavengers of the insect world, such as the blow flies and the carrion beetles. It is natural, therefore, for the Carpet Beetles to follow animal material into processed merchandise, such as fabric and leather and attack it in its "man made"

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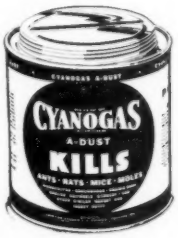

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Principles of Control

TO CONTROL these insects we must remember the salient points of their life history. First, the eggs are laid on or near the fabric; second, the larvae remain on the fabric until they are mature; third (except for *A. verbasci)* they usually pupate off the fabric in some nearby crack or crevice; fourth, the adults, at least up to the time immediately after mating, are lovers of pollen and sunlight and usually mate on flowers; fifth, the larvae are negatively phototropic—that is, they dislike light and will seek the dark places; sixth, they are long lived; and seventh, they are common out of doors.

To control the Carpet Beetles, then, several things must be considered. The fabric itself must be cleaned or sprayed in order to wipe out any present infestation. The cracks and crevices in the general vicinity of fabrics must be sprayed thoroughly in order to insure the destruction of any adults that might be pupating there, as well as taking care of any which might be living in the walls. The light areas, such as windows, should be inspected and sprayed to kill the adults that might be attracted to the light.

The question of which insecticide to use is a difficult one to answer. The residual insecticides, DDT, Lindane, Chlordane, and the Pyrenones are all effective against the Carpet Beetles. The selection of which is to be used is a matter for the pest control operator and the circumstances under which it will be applied. DDT, for instance, should not be used on a dark carpet because the crystals would probably show. Pyrenones might be considered when there is a crawling baby in the house, because its low toxicity is a factor in its favor. Contact the manufacturers of various insecticides who will gladly give you the residual values of their chemicals against Carpet Beetles, as well as the amount to be used and other pertinent data.

With the tremendous amount of travel over a world wide area during the last war, especially since so many airplanes were used, there was brought about a hazard which has not yet been fully realized. There existed a fine possibility of translocating insects into areas where they have never been found before. Many years will pass before the real damage is realized and discovered, but if we are vigilant in watching for outbreaks of these new insect pests, it will be possible to curb them before they have a chance to spread as rapidly as they otherwise might.

There are many *Dermestids* which have been known to attack fabrics in parts of the world far from our shores, but with the huge amount of travel the war necessitated, plus the hurry in which that travel had to be made with no chance of checking the insects that might be present in all the flights made from Africa and Europe and other places, it is very possible that some of these insects have found their way into this country unnoticed. Only time will tell how many have arrived here to become established.

Here is a list of the *Dermestids* that have been known to attack animal matter in other parts of the world. No description is given, because it would make this series too long. The best thing that should be done by the pest control operator, if an insect is found attacking fabrics which does not fit the descriptions of the common carpet beetles, is to send it to your State College or some other recognized authority. They will gladly identify it for you, and then there will be a record of new infestations.

Besides these, the cockroach and silverfish should be considered briefly, because they do damage fabrics, even though it is incidental to their real reason for eating. The casein glue on books and the starch in clothing attract the roaches, while the starch in clothing attract the silverfish. The fabric is damaged as the preferred food is eaten. These two insects will damage any fabric, synthetic or otherwise.

In conclusion, I would like to say that the first and one of the most important items in insect control is to know what insect you are attacking; know its life history and habits, and by using this knowledge to your advantage, the problem can then be solved intelligently and with a minimum of effort. An insect can be killed easily once you can find it and know its habits. These things are the "know how" of the Pest Control Business, and are the difference between a good job well done that brings in a profit, and a bad job that costs the PCO money and a lost customer.

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Metcalf, C. L. and Flint, W. P.—
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Name	Where Found	What Damaged
Thylodrias contractus	U.S.S.R., N. Am.	silks
Dermestes maculatus	Canada, N. Am.	leather, linen, wool, cork, cotton, books, tobacco, etc.
Dermestes coarctatus	Japan, U.S.S.R.	Silk
Dermestes frischii	Europe, Asia, Africa Madegascar, N. Am.	Silk, cotton, linen
Dermestes marmoratus	West. U. S., Calif, Mexico	Dry animal prod.
Dermestes lardarius	Cosmopolitan	Woolens
Dermestes murinus	Europe, U.S.S.R.	Silk
Dermestes ater	Cosmopolitan	Silk
Dermestes nidum	U. S.	Fur
Attagenus gloriosae	Nearly cosmopolitan	Woolens
Attagenus lobatus	Spain, Egypt, Arabia, Mesopotamia, China	Fur, feathers, woolens.
Anthrenus pimpinellae	Europe, Asia, Africa, N. Am., Japan, E. Indies, Greenland	Fur, feathers, wool
Anthrenus museorum	Nearly cosmopolitan	Wool and silk
Anthrenocerus australis	Australia, Britain	Wool
Trogoderma varium	Japan	Animal substances

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"SERVING THE PEST CONTROL INDUSTRY"

Advance News on *REGIONAL CONFERENCES*

11th Southern PCO Conference

Louisiana State University
Baton Rouge, Louisiana

Jan. 29, 30, 31, 1951

Hotel and tourist motel accommodations in Baton Rouge are ample and the University has a new cafeteria where meals may be obtained at reasonable prices.

Registration fee of $15 is payable either by mail or upon arrival. Fee entitles registrant to a copy of the conference manual, banquet ticket, and to all university sessions.

An especially fine program covering new control methods, new insecticides and rodenticides, plus films and group discussions has been planned by Professor O. W. Rosewall. Briefly it includes:

Monday A. M.: "Methyl Bromide: Its Nature and Uses as it Pertains to the PCO" by J. L. Maxwell; and "Safe Use of Present Day Chemicals and Formulations" by Wm. O. Buettner;

Monday afternoon will feature a demonstration on an experimental procedure in insect control by C. E. Smith, and then a symposium on cockroaches with C. A. Trimbos, J. Harvey Roberts, Carl Abel, L. S. Bridges, A. S. Krawcheck and Carl H. Ticer participating;

Tuesday morning's sessions will center on fly control with films and featured talks by H. F. Schoof, J. H. Coffey and H. L. Fellton;

Tuesday P. M. meetings cover rodent control including talks by H. J. Spencer, Thomas Gaines and Wm. O. Buettner, films and a round table discussion. The gala annual banquet will be held **Tuesday evening** in the Heidelberg Hotel and ladies are invited.

Wednesday morning's closing conference is to be on approved reference procedures for termite control with representatives from eight states taking part in an illustrated panel discussion.

A few slight changes may occur in the program, but all evidence points to this meeting being the best of all those presented in the past ten years.

Advance registration should be sent to Professor O. W. Rosewall, Department of Zoology and Entomology, Louisiana State University, Baton Rouge 3, La.

•

11th Eastern PCO Conference

University of Massachusetts
Amherst, Massachusetts

Feb. 1, 2, and 3, 1951

Each delegate planning to attend this first-rate eastern meeting is expected to make his own housing arrangements at either the Lord Jeffrey or Drake hotels in Amherst, or the Northampton hotel in nearby Northampton, Mass. Write direct to the hotel.

Professor Arthur I. Bourne is in charge of the three-day conference which will include:

Thursday morning; an up-to-the-minute report on developments in pest control methods, materials and machinery led by Dr. Ralph E. Heal. That **afternoon** will be devoted to rodent control problems with particular discussions on warfarin under leadership of H. H. Merrill, district agent, supported by Walter W. Dykstra, Justus Ward and others from the Fish & Wildlife Service in Washington. In the **evening,** John K. Medoff, will lead an open forum on industrial problems.

The **entire day Friday** will be taken over by laboratory sessions featuring a study of "Comparisons of Confusing Identifications" concerning distinguishing characters of species hard to tell apart. The annual banquet **Friday evening** at the Lord Jeffery Inn is to have a special speaker.

Saturday morning's session covers a comprehensive discussion of "Problems in Fly Control" by Dr. H. H. Schwardt, Connell; Reports on 1950 experiences and outlook for 1951, by Dr. J. B. Schmitt, Rutgers; and an explanation of the strip method of fly control by David Pimentel of Cornell.

Inquiries for further information should be sent to the National Pest Control Association, 30 Church St., New York City.

•

14th Purdue PCO Conference

Purdue University, Lafayette, Ind.

Feb. 5-9, 1951

Lodging facilities for the Purdue meeting are adequate to take care of everyone attending if reservations are made in advance. Each person should send his request personally for a room to one of the following places: Purdue Memorial Union, Purdue University; Fowler Hotel; or Lahr Hotel, all in Lafayette, Ind.; or the Cedar Crest Hotel, West Lafayette, Ind., which is a mile and a half north of the campus, convenient only for those driving.

Professor J. J. Davis, head of Purdue's department of entomology is in charge of this five-day conference. Purdue was the first university to offer a short course for pest control operators and each year attendance has been larger than the preceding one. This year's program is as follows:

The first day, **Monday** is devoted primarily to a discussion of the principles of entomology, insect identification and recognition of insect damage. This is of particular interest to PCOs attending for the first time. In the **evening,** there will be a meeting for NPCA members.

Tuesday morning's session is to feature rodent control with a thorough discussion of warfarin by W. W. Dykstra, W. D. Fitzwater and G. C. Guerkirk. Rodent repellants, rodent baits and tracking dusts will be discussed by J. F. Welch, Harland Snuyler and G. Dyksterhouse, respectively.

A panel on rodent control will be held **Tuesday afternoon** and there will be a demonstration of exhibited materials.

B. E. Montgomery gives a report on his trip to New Zealand, **Tuesday evening** which will also include a talk on how good pest control can be publicized.

Wednesday A. M.: Ants, the pest of the year, will be covered from identification, their habits and methods of control. An equipment demonstration is to be held in the Field House **Wednesday afternoon.**

Pest control in food industries is the topic for **Wednesday evening's** meeting, plus a talk on the relation of Arthropods to public health.

Termites, other wood-infesting insects and rots are to be explored and studied **all day Thursday.** New chemicals and control procedures with PCO-experience stories are part of the program.

Dr. S. A. Rohwer, Assistant Chief, Bureau of Entomology & Plant Quarantine, USDA, is featured speaker at the annual banquet **Thursday evening.**

Friday morning's concluding session includes "A Place for Commercial Pest Control in Military Establishments," "Status of Fly Control" and "Problems in Area Insect Control."

Last minute changes may take place but the excellent program listed briefly above will include essentially all the subjects mentioned.

Registration can be made upon arrival or can be sent in advance to Professor J. J. Davis, Department of Entomology, Purdue University, Lafayette, Ind. Prof. Davis will be glad to send further information if you write him.

Coming:

Oklahoma Pest Control Short Course, Oklahoma A. & M. College, Stillwater, Okla., Feb. 1-3.

California Pest Control Operators, Annual Meeting, Mission Inn, Riverside, Calif., Feb. 25-27.

Pennsylvania Fifth PCO Short Course, Pennsylvania State College, State College, Pa., March 7-9.

Canadian Pest Control Ass'n. Ninth Conference, Ontario Agricultural College, Guelph, May 7-9.

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ISOTOX Dairy Spray and ISOTOX Wettable No. 250... wettable powders for water dilution. Contain wetting, spreading agents. Finely ground, mixes readily, stays in suspension	25% Lindane Formulation	Flies, ants, roaches in *dairy* and livestock barns, creameries, milk sheds and milk processing plants. Certain pests on dairy and beef cattle, hogs, horses, sheep. Many plant pests	1-lb. can 4-lb. can 20-lb. pail	12 4
ISOTOX Liquid Dairy Spray... water dilution	20% Lindane Formulation	Same *dairy* insect control as above	4-oz. bot. Pint bot. 1-gal. bot. 5-gal. drum	24 12 4
PEST-B-GON Spray... water dilution	25% DDT Concentrate	Residual spray for barns and other buildings: flies, fleas, mosquitoes; also such plant pests as thrips, caterpillars, beetles, leafhoppers	1 gal. can 5 gal. drum 50-gal. drum	4
PERSISTO Wettable... water dilution	50% DDT	Same as PEST-B-GON Spray above. Also livestock pests: lice, hornflies and certain other flies on cattle; sheep ticks on sheep; flies and lice on hogs	4-lb. bag 6-lb. bag 50-lb. bag	12 8
ORTHO-KLOR Sprays... use undiluted or with water depending on formulation	Chlordane	Ants, grasshoppers, crickets, thrips, certain others	1-gal. 5-gal. 50-gal.	4
ALLTOX Sprays... water dilution	Toxaphene	Ants, flies, aphis, grasshoppers, crickets, red spider mites	1-gal. bot. 5-gal. drum 50-gal. non-returnable steel drum	4
ANT-B-GON Ant Poison... for use in many types of feeders. (West Coast only)	0.2% Sodium Arsenite plus sweetening material	Argentine and sweets-eating ants	30-gal. returnable drum	
TERMCO Wood Guard... use undiluted for uses other than weed control. (West Coast only)	0.1% lindane, 2.0% DDT, 4.4% pentachlorophenol, 0.6% other chlorophenols, 90% petroleum oils	Wood and soil termites, wood-boring beetles, wood-rotting fungus; weeds along fence rows, driveways, walks, etc.	5-gal. drum 50 gal. returnable steel drum	
ORTHO Weed Control...	WEED-B-GON 64 (Amine 2,4-D), ESTERCIDE 330 (Ester 2,4-D), ESTERCIDE T-2 and ESTERCIDE-T 245 (Esters of 2,4,5-T), TRIOX (Arsenical Weed Killer, Soil Sterilizer).			

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CASE HISTORY: Death of a PCO

THE VERY LIFE of a fumigator is at stake when any safety precaution is overlooked. In performing a fumigation there is no simple rule that he can follow, no device available which will guarantee that he will live through the experience. Unless he has the utmost respect for the lethal materials which he uses, the fumigator runs the risk of being his own executioner every time he undertakes a job.

The death of an experienced fumigator in St. Louis, caused by over-exposure to methyl bromide, tragically underlines the complex nature of the problem of safely performing a fumigation.

The fumigation involved was in charge of a man 50 years of age with ten years of experience in fumigating with methyl bromide. It was he who died. In this report, we shall refer to him as "the fumigator". He had been somewhat ill on the week-end preceding this fumigation from an over-exposure to methyl bromide. In charging the building with methyl bromide he was assisted by two laborers and a 45 year old man; the last man we shall refer to as "the first helper". In airing out the building, he was assisted by a 26 year old man, to whom we shall refer as "the second helper". Both helpers were experienced in this work.

Was Fully Licensed

The fumigator had a certificate of qualification from the Board of Examiners of Fumigators of St. Louis, had obtained a license, and had obtained a permit for the fumigation. One inspection of the premises by the city fumigation inspector, previous to the release and one after release of the gas revealed nothing in violation of the ordinance regulating fumigations.

The building fumigated was a one-story, brick warehouse, with a large number of windows, in good structural condition and measuring 126 ft. by 115 ft. by 26 ft. It contained about 4000 tons of rice in bags at the time of the fumigation.

At 11 p. m. on a Friday, in June, 1950, the fumigator and the first helper entered the building, which had been well sealed, wearing gas masks which they had tested for tightness and with approved type canisters which had never before been used. It was learned from code markings on the canisters used in the masks of the fumigator and the first helper that they were manufactured in June, 1948, and June, 1947, respectively. The men went around to each of the ten 100 pound net and three 10 pound net cylinders of methyl bromide which had been placed on top of the piles of bagged rice and opened the valves, each man taking a certain portion of the building. No tubing was attached to the cylinders. This operation required about 20 minutes and gave a dosage of about 2.7 pounds of methyl bromide per 1000 cubic feet based on an empty building. They left the building, the first helper keeping his mask on for 5 minutes more while he sealed the exit door. Neither man noticed any symptoms of methyl bromide poisoning at this time.

Ignored Symptoms

At about 1 a. m. on the following Monday, the fumigator and the second helper entered the building and remained there for about 5 minutes, opening three large doors. The fumigator wore the same mask that he had worn during the charging period, and the second helper wore the mask which had been worn by the first helper. The same canisters that were used during the charging were again used. On coming out of the building, the fumigator said he thought he had inhaled some methyl bromide.

At about 2:30 a. m. the fumigator and the second helper re-entered the building, wearing their masks, and remained there for about thirty minutes, engaged in taking the empty cylinders, weighing 70 pounds for the large ones and 17 pounds for the small ones, down from the piles of rice and moving them to a door of the building. On leaving the building the fumigator was vomiting and shaky.

At about 3:30 a. m. they again entered the building with their masks on to continue removing cylinders. After 30 minutes they left the building. The fumigator had a staggering gait at this time. He assured his helper that he would be alright, so the helper went home. The fumigator remained on the job. At about 7:45 a. m. he was joined by another man who urged him to obtain medical attention. His urging was refused until, at 8:45, in a near state of collapse the fumigator was taken to a hospital.

From this time until he died, at 7:45 a. m. on the following day, the hospital reports showed that his lips and skin were a dusky blue color (cyanotic) and that he was breathing with great difficulty (dyspnoea). He was mentally sluggish and had several convulsions. The laboratory reports indicate that the carbon dioxide content of his blood was increased greatly. Physical examination revealed excessive mois-

Summary of a report on the death of a fumigator from methyl bromide poisoning

by

J. J. SCHUENEMAN

Air Pollution Engineer, Industrial Hygiene Section, St. Louis Health Division

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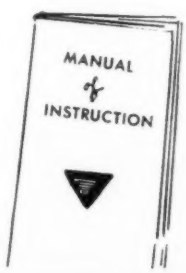

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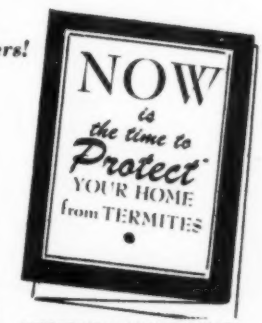

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ture in the lungs (oedema). It is believed that this was the exact cause of death, being the result of both the toxic and irritant action of methyl bromide, and its decomposition products, methyl alcohol and sodium bromide, on the lung tissues.

The first helper at no time became ill, but the second helper entered the hospital because of a staggering gait and general muscular inco-ordination, at about 10 a. m. on Monday and was released on Tuesday afternoon, still somewhat shaky, after observation and treatment.

The canisters used in this fumigation were tested 18 days after they had been used. It was found that they emitted air containing 100 ppm. of methyl bromide when fresh air was passed into them and emitted air containing 150 ppm. of methyl bromide when air containing 1000 ppm. of methyl bromide was passed into them.

Analysis of Causes

It seems from all the foregoing that the primary factor in the fumigator's receiving an over-exposure to methyl bromide was the exhaustion of his gas mask canister. This exhaustion was caused in part by the use of the canister in releasing the gas from the cylinders when concentrations, close to the cylinders which were being opened, in excess of the allowable 2% (stated by the canister manufacturers) may have been encountered. An accelerated breathing rate probably prevailed due to the physical exertion required to move about on the piles of rice from one cylinder to the next to open the valves. This exposure lasted twenty minutes, a rather long period of time. The capacity of the canisters was further taxed during the opening of the building (when concentrations were probably still quite high due to the large dosage used) and the removal of the 70 pound empty gas cylinders, which exposure lasted a total of about 65 minutes and again with accelerated breathing rates due to physical exertion. If a phenomenon similar to that encountered in laboratory tests occurred, i. e., the canister discharging methyl bromide, the fumigator was exposed to concentrations of methyl bromide in excess of 100 ppm. for this 65 minute period The fact that the canister was two years old may have had a minor effect in reducing the amount of methyl bromide it was able to absorb and retain. Another factor which might have entered into the fumigator's being exposed to a lethal amount of the gas was the possibility of a loose fit of his mask. This does not seem likely since the helpers stated that the fumigator tested his mask for tightness of fit before entering the building.

Once the fumigator had received his over-exposure several factors were involved which aggravated the severity of his condition. He possibly had not fully recovered from the exposure he had received on the previous weekend. He re-entered the building, wearing a gas mask whose canister was probably discharging methyl bromide, and exposed himself to more methyl bromide after he knew he was suffering from an over-exposure to it. Then, knowing he was ill, he failed to get medical attention for about six hours after the first symptoms were observed.

Recommendations

1. Wherever possible methyl bromide should be discharged into a building from the outside, eliminating any need for entering the building during the charging period. When possible, provision should be made to initially air out the building through openings which can be appropriately secured during fumigation, and opened after fumigation, from the *outside*.

2. If it is not possible to charge an enclosure from the outside, gas cylinders should be placed so as to require a minimum of time to get around to each one to open it. Fans can be used to secure good gas dispersion if such placement of cylinders will not give it.

3. Removal of empty cylinders should not be undertaken while gas remains in the building. Such action is entirely unnecessary and only increases exposure to methyl bromide by increasing the time in the building and by causing accelerated respiration rates due to heavy labor.

4. Only dosages of fumigants sufficient to kill pests should be used.

5. Gas mask canisters should be plainly marked with an expiration date by the manufacturers.

6. The use of some odorous warning agent to be mixed with methyl bromide should be considered and investigated by a qualified and disinterested research agency or organization, with recommendations as to the practicality of the use of such warning agent.

Harold Straube

Frank Rush

Powell Co. Men Promoted

Harold S. Straube has been advanced to general manager of John Powell Chemical Co., Huntsville, Alabama, according to an announcement by H. Alvin Smith. John Powell & Co. president in New York City. He succeeds Benton H. Wilcoxon who will now devote his full time to basic chemical manufacturing of an associated firm, Calabama Chemical Co.

In New York, Mr. Frank J. Rush, formerly comptroller of the company, has been promoted to assistant treasurer.

Lady Bugs Elect . . .

We couldn't help giving the Lady Bugs a "last word" of mention on their activities at the NPCA convention, so here's a complete list of officers elected at the Cincinnati meeting: president, Mrs. Lester (Betty) West, Boston, Mass.; vice-president, Mrs. George R. (Gertrude) Elliott, Worcester, Mass.; correspondence-secretary, Mrs. E. A. (Marjorie) Alderman, Santa Barbara, Cal.; treasurer, Mrs. W. L. (Marie) Seale, New Orleans, La.; secretary, Mrs. H. O. (Merrill) Abel, Houston, Texas.

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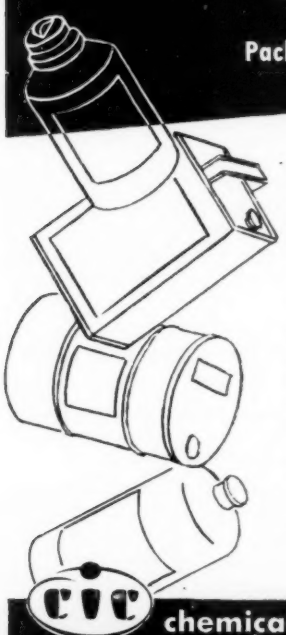

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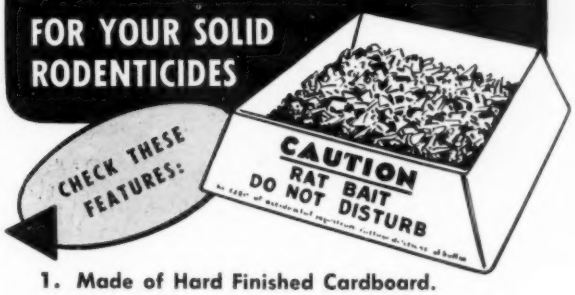

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PEST CONTROL

NEWS

2 Receive NPCA-Purdue Awards

Miss Magdalene E. Pferrer of Louisville, Ky., and Paul S. Kono of South Euclid, Ohio, two entomology majors at Purdue University shared in the $200.00 NPCA Scholarship award presented at the Agricultural Convocation at Purdue, November 20.

This recognition, usually awarded to the entomology student with the highest scholastic standing in his or her freshman year plus the highest rating in a general knowledge test, was divided between the two students, now sophomores, because their grades were almost identical.

Both Miss Pferrer and Mr. Kono, who entered Purdue in the fall of 1949, were distinguished students during their freshman years. Previous to that Mr. Kono, born of Japanese ancestry in Los Angeles, was employed at the Medical Research Laboratory, Western Reserve University, Cleveland, where he worked in drafting and photography. His special interest is insecticide research.

Bohman Belongs

Our faces are red because of the caption under the group picture of NPCA past presidents which appeared on page 20 of Pest Control for November, 1950. We stated that Pete Bohman was the only one in the group who had not served as President of the Association. Mr. Bohman did hold that office in 1942-43.

L. A. Moore Grandpa Again

A diaper dispatch which came to us recently via Leon A. Moore informs us that his daughter, Susan, and son-in-law, William A. Pope, presented their little girl, Cynthia Ann, with a 9 lb. 7 oz. baby brother, on October 22, 1950. Cynthia (Cindy) now a year and one-half old, is a striking red-head, but no mention has been made of the color of her little brother, William Leon's hair. Maybe there wasn't quite enough there for accurate comment.

Papa, William, is vocational and educational guidance counselor at Troy High School, Troy, New York. Grandpa, Leon, is owner-operator of L. A. Moore & Co., Inc., Utica, New York.

Purdue's Prof. J. J. Davis and Dean V. C. Freeman hand NPCA scholarship award certificates to winners Miss Magdalene E. Pferrer and Paul S. Kono.

Office Forms

Members of the National Pest Control Association wishing to design new office forms can now borrow sample forms and letterheads, used by pest control firms throughout the country, from the NPCA office in New York. Jacques Hess, chairman of the Office Forms Committee, after a year of extensive research has attractively prepared two folders containing clear plastic sheets showing representative forms which will be loaned to members who pay the postage to and from their offices.

Bats Transmit Rabies

In temperate zone countries vampire bats have been found to transmit rabies, according to Dr. James H. Steele, chief veterinarian of the U. S. Public Health Service's Communicable Disease Center at Atlanta. At the recent annual meeting of the American Veterinary Medical Association in Miami Beach, Florida, Dr. Steele reported that bats are as dangerous as mad dogs or foxes in carrying this disease which is sure death to both man and animals unless serum is given before symptoms appear.

DuPont 75% DDT Powder

A new DDT formulation for use in preparation of insecticidal sprays is now being made by the DuPont Company, Wilmington, Delaware.

Known as "Deenate" 75-W DDT insecticide, it is a wettable powder containing 75% technical DDT. It will supplant a 50% DDT wettable powder previously offered by the DuPont agricultural chemicals section.

From the standpoint of convenience, the new product requires less storage space, for more of the compound is active insecticide. This also will mean a lower poundage of the material will be required per 100 gallons of spray to supply the same percentage of DDT.

Prescott Marries

James M. Prescott was married to Miss Doris McGuire in a ceremony which took place in Chicago, Ill., November 23.

Prescott is the son of Mrs. M. S. Prescott who is vice-president of the Illinois Pest Control Association and manager of the Protex Service Co. of Chicago.

'Twas a Weiss Stork

Latest stork notice comes to us from Grace and Alvin Weiss who announce the arrival of Harriet Jane, November 9, 1950. Baby weighed in at 8 lbs., 10 ounces.

Mr. Weiss is proprietor of Tri-Boro Exterminating Co., Bronx, New York.

Thank You, Mr. P.C.O.!

Thanks for trying and buying TIFA. Thanks for helping us **prove**—over a 5-year period—the greater speed, effectiveness and economy of TIFA's insect fogging method.

Thanks for all your nice letters telling of your own TIFA "success stories" . . . of how you've made this amazing machine produce extra profits in your vital business.

Thanks for your compliments regarding TIFA'S sturdy compactness, ease of handling, maximum dependability . . . for your valued suggestions on new places to use TIFA — over swamps, in thickly populated areas, at resorts and recreation spots, on farms, in cities and industry.

Thanks for everything, Mr. P.C.O. — most sincerely!

TIFA

TODD INSECTICIDAL FOG APPLICATOR

Carrying Underwriters' Listing Seal

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GET ON THE BAND WAGON

Follow the Crowd With PER-MO Profits

- ★ **Per-Mo 5 Year Guarantee Moth Proof Liquid**
  Packed in Pints, Quarts, ½ gals., gals., and 5 gal. containers
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  Packed in Gallon containers or in Drums.
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  Packed in 8 oz. bottles or in gallon containers.
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  Packed in 4 and 16 oz. containers or in Bulk.
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  Packed in 4-8-16 oz. jars, and in Bulk.
- ★ **Per-Mo Rat Paste, Made With Antu**
  Packed in 4-8-16 oz. jars, and in Bulk.
- ★ **Per-Mo "Chek" Deodorant**
  Packed in Quarts or in Gallons.

WE WILL SHIP YOU A GENEROUS SAMPLE OF ALL THE ABOVE PRODUCTS FOR $5.00 EXPRESS PREPAID.

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STANDS THE TEST
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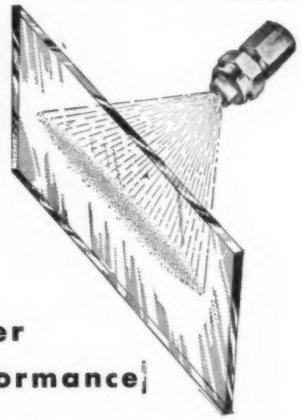

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interchangeable ORIFICE TIP

better performance!

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Engineers and Manufacturers
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Suppliers May Exhibit at Purdue

Space is now available for exhibiting small equipment and devices at the 15th Annual PCO Conference to be held at Purdue University, Lafayette, Indiana, February 5-9, 1951.

Suppliers wishing to exhibit material should write Prof. J. J. Davis, Chief in Entomology, at Purdue and indicate what they wish to show and the amount of space necessary.

The demonstration of applicators, sprayers, etc. useful in pest control is scheduled to take place Wednesday afternoon, February 7. Suppliers who wish to demonstrate their equipment should also communicate with Prof. Davis.

Gemmell Joins Geigy

Louis G. Gemmell has joined the technical staff of Geigy, Inc., New York, will be located at the Bayonne research laboratory, and will be in the field of technical sales promotion.

CHECK PEST

45 to 1

C-75 Concentrate

Makes Your Money Go FARTHER!

1 GALLON MIXES WITH 45 GALLONS OF WATER TO MAKE A READY-TO-USE 2% CHLORDANE SOLUTION! Offers Maximum Freight Savings!

CHECK-PEST C-75 CONCENTRATE
Contains 8 lbs. Chlordane per Gallon!

Emulsifies easily with water and won't injure plants! Kills insects quickly . . . and surely!

KILLS HOUSEHOLD PESTS:

Roaches	Spiders
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KILLS GARDEN INSECTS:

Grasshoppers	Ants
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Onion Maggots	Chiggers

Order CHECK PEST C-75 *Today!*

1 gal. glass container, 8.50 gal.
1 gal. glass container, (4 to a carton) . . . 8.25 gal.
5 gal. lacquer-lined can, 8.00 gal.
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'51 Materials Handbook

"Pesticide Handbook, 1951," a new publication listing trade names, ingredients, uses and manufacturers of commercial pesticides is to be published early in 1951, according to Dr. Donald E. H. Frear, editor of the new publication. The book, which will contain approximately 200 pages, will cover insecticides, fungicides, herbicides, rodenticides and application machinery.

This book will contain the same type of information as "Pest Control Materials," compiled by A. L. Prince, M. T. Hilborn and D. E. H. Frear, and published by the Maine and Pennsylvania Agricultural Experiment Stations in 1949 and 1950. It is planned to publish revisions of this handbook annually.

Any trade-marked household or agricultural pesticide sold in the United States or Canada is eligible for listing in this new publication. Further information may be obtained by writing The Editor, "Pesticide Handbook," P.O. Box 798, State College, Pa.

Organic Chemicals Booklet

Data on applications and physical properties of more than 250 synthetic organic chemicals can be had in the 1951 edition of "Physical Properties of Synthetic Organic Chemicals," a booklet just issued by Union Carbide and Carbon Corporation. Information is given in tabular form for ready and easy reference.

Copies of this 16-page guide for organic chemical users may be obtained without charge by writing Carbide and Carbon Chemicals Division, 30 East 42nd St., New York 17, N. Y. Ask for Form 6136.

War Problems Key E.Pa. PCA Meet

Industry problems of obtaining adequate manpower and materials during the current emergency was the reason for calling a special meeting of the Eastern Pennsylvania Pest Control Association, November 20th, at the Robert Morris Hotel, Philadelphia.

NPCA executive secretary, William O. Buettner, and NPCA tech-

nical director, Dr. Ralph E. Heal, were principal speakers in a program which explained the importance of supplying adequate information to the national association's headquarters so the industry could be properly represented in Washington.

Answers to the following questions were sought: How many workers do you employ? How many male, how many female? Of the males, how many are 18-26 years old, how many 27-35 years, and how many are over 35 years of age? What is the average number of hours in your work week?

Kotler Pros Law To Ind. PCA

Louis Kotler, secretary of the Tennessee Pest Control Association and Memphis district manager for Orkin, was featured speaker on the topic, "The Need for State Legislation in Pest Control" discussed at the first fall meeting of the Indiana Pest Control Operators' Association. Thirty-three PCOs attended this October 24th meeting, held during the NPCA convention in Cincinnati, Ohio, to hear Mr. Kotler who was active in the creation of the Tennessee Law, now regarded as a model for other states.

The other side of the picture, "Opposition to Pest Control Legislation," was to have been given at the association's December 9th meeting by Ted Oser, vice-president of the Orkin Co., Atlanta, Ga. No report on the latter meeting at presstime.

NSDA Discusses Sprayer Research

G. H. Collier, research committee chairman of the National Sprayer and Duster Association outlined the extensive research programs being carried on by principal manufacturers in the industry at the recent Quarterly meeting of the NSDA held in New York city. Main topic of discussion was the value of such programs and the facilities available for expanding group-sponsored research.

Featured speaker was J. Dewey Long, Special Assistant in the Division of Agricultural Engineering, Agricultural Research Administration, Beltsville, Maryland.

Residex "Baitainers"

New warfarin bait containers are now available from the Residex Corporation, Foot of Centre Street, Newark, N. J.

Called "Baitainers" these containers are made of durable cardboard and come in flat pieces which can be folded quickly into receptacles about 4 inches square at the base and 1¼ inches deep. The sides taper inward ½ inch.

Company names can be printed at no charge on the backs of Baitainers in orders of 20,000 or more. PCOs interested in obtaining a supply of Baitainers should send their inquiries to the Residex Corporation.

Hygienic Sanitation Expands

The Hygienic Sanitation Co. has moved into their location in the Wimbrow Building, 310 East Main St., Salisbury, Maryland. Official opening date was November 15, 1950.

have you tried..

- **IT'S TIP-PROOF!** The special flared skirt fits flush to floor all around...will not tip even if a rat steps on the edge of the container.
- **IT'S TESTED AND APPROVED!** Tests show no signs of leakage of seepage after 18 days. Specifications call for 3 days.
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Trial Order—1 M . . . . . $6.75 M
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Minimum orders 4 cases shipped prepaid.
Larger quantity prices on request.

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Short Supply, Higher Prices Predicted For Insecticides at CSMA Convention

Oppenheimer Reelected President and Parkinson Heads Insecticide Group

Expansion of government controls to the allocation of materials, plus an expansion of costs, increased military requirements, greater manpower problems and stronger demands for and production of chemicals in coming years constitute reasons why users of pesticides can expect shortages and higher prices in 1951. This was the opinion expressed by Dwight Moody, Chemical Editor, *New York Journal of Commerce*, speaking before the 37th annual meeting of the Chemical Specialties Manufacturers Association, held at Hotel New Yorker, New York City, December 4 and 5.

Benzene, important constituent of many new agricultural chemicals, is in short supply because of an increased demand in the manufacture of synthetics — plastics, synthetic rubber, etc.—a demand which was non-existent prior to World War II, Moody said. Present demand for benzene is 30 million gallons in excess of current production. Ethyl alcohol, chlorine and caustic soda are also equally scarce.

Fifth-round wage increases now beginning will affect the chemical industry in 1951, Moody observed.

Leonard J. Oppenheimer, West Disinfecting Co., Long Island City, N. Y. was reelected CSMA president and all the other 1950 officers were chosen to serve another year. These include: Clarence L. Weirich, C. B. Dolge Co., 1st VP; Melvin Fuld, Fuld Bros., Inc., 2nd VP; P. C. Reilly, Jr., Reilly Tar & Chemical Corp., treasurer; and Dr. H. W. Hamilton, H. W. Hamilton Co., Inc., secretary.

Members of CSMA's insecticide division reelected T. Carter Parkinson, McCormick & Co., Inc., their chairman, and James A. Green, Standard Oil Co. (Ind.), co-chairman. Members of the administrative committee chosen are: John Rodda, U. S. Industrial Chemicals; A. C. Miller, Gulf Research & Development Corp., and Preston Heller, B. Heller & Co.

Secretary H. W. Hamilton, in his annual report, revealed the CSMA is promoting discontinuance of the words "economic poisons" and replacing them with the single word "pesticides", a term which carries less stigma and permits less-prejudiced discussion of the subject.

Fly Control Chemicals, Techniques

Six of the papers delivered before the insecticide division meeting dealt with effectiveness of new chemicals in fly control.

Sanitary measures, screens, and the application of residual insecticides to interiors of barns will provide dairy fly control, M. H. Doner of the J. R. Watkins Co. said. Poor fly control, he observed, may be a result of too much dependence on chemical application.

Acquired fly resistance is no new phenomenon in entomology, Dr. W. M. Upholt, Communicable Disease Center, Atlanta, Ga., told the group. Flies have developed resistance to all of the chlorinated hydrocarbons and pyrethrum as well. It was expected that houseflies would develop resistance, he said, because they are a very adaptable species. "Therefore, the substitution of new insecticides has not shown a great deal of promise insofar as the future of fly control is concerned."

Speaking of new chemicals, Dr. Upholt reported, "In the case of dieldrin, we have found a high degree of resistance in fly populations in two areas which received applications of dieldrin late in 1949 or early in 1950 . . . On the other hand, there are areas other than the two mentioned where we have used dieldrin even longer, starting somewhat earlier in 1949, and with more frequent applications, and yet no resistance is apparent to date.

Pyrethrum-type space sprays are still effective, Upholt said, but there is no way of knowing how long they will remain effective. Fly resistance to DDT has not been found to be universal as is sometimes implied. Strains have been found in which resistance is not sufficient to worry about. Dr. Upholt reported, " . . . it is our impression that there are many areas, especially in the northern states, where flies are still being adequately controlled by DDT." It was also pointed out, however, that resistance could be anticipated if general use of DDT is continued and that flies will not be controllable by the use of any residual insecticide.

Emphasizing the "*if*", Dr. Upholt opinioned, "If we can so modify our methods of house fly control that insecticides no longer become a major factor in the house fly environment, then it is reasonable to suppose that the species will no longer adapt itself through the development of resistance." Where sanitation is poorest, resistance is more acute. Fly breeding does not necessarily go with poverty, but rather goes with an over abundance of food, he pointed out. The Public Health Service is pressing a campaign of sanitation for fly control supplemented with chemicals when necessary.

Availability of Dieldrin

Twenty thousand pounds of dieldrin were used experimentally during 1949 and 1950 and the U. S. Public Health Service has shown interest in the use of this chemical for area-wide fly control, Dr. C. C. Compton, Julius Hyman & Co., told the Monday afternoon divisional meeting. The life of dieldrin as a fly control chemical is probably limited due to the fact that in almost every area where it has been used, flies are already known to be resistant to DDT, chlordane and lindane. Results have revealed that flies resistant to chlorinated hydrocarbons, soon become resistant to dieldrin also.

So far no cases of human poisoning have been reported from the use of dieldrin, and this is due primarily to the fact that all spray crews were cautioned about possible hazards of the material. Some poultry have been damaged through missuse of dieldrin.

Dr. Compton revealed that the "U. S. Public Health Service has gone on record as recommending

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CHLORDANE All chlordane used in Residex formulations is refined grade. According to individual preference Residex 20 oil concentrate, Residex 30 economical slow breaking emulsion concentrate, or stable Residex 50 emulsion concentrate may be used.

PYRENONES Safticide Emulsion Concentrate is indicated for residual control of the food infesting insects. This product is suitable for use in many instances around food or food handling machinery where toxic hazards would prohibit the use of other materials.

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Commonly called rat and roach paste. A specific application for the larger species of roaches. Also an attractive and effective rat poison.

10 lbs.	$ 6.00	50 lbs.	$19.00
25 lbs.	11.00	100 lbs.	35.00

SENCO ARSENIC SOLUTION

A 9 to 1 Concentrate. One gallon plus nine gallons of water, makes TEN GALLONS of a toxic drink for rats and mice.

One gallon $6.50 Five gallons $25.00

SENCO MICROFINE ARSENIC

Kills rats and mice. Three times more toxic than ordinary powdered arsenic.

10 lbs.	$6.00	50 lbs.	$13.00
25 lbs.	9.00	100 lbs.	22.00

POISON GRAINS FOR MICE.

Strychnine or Thallium treated Canary Seed, and other grains. Write for complete price list.

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or encouraging the use of dieldrin for the control of flies in outdoor situations on an area-wide basis by city, state and federal agencies, provided that the recommended precautions as outlined by the PHS are followed, and that spray crews using this material do so under adequate supervision."

The label status of dieldrin is uncertain, but it is felt that custom sprayers, including trained pest control operators should have dieldrin formulations available for outdoor fly control activities in 1951, Compton said. The product will not be available for over-the-counter sale soon.

Strip Treatment

New treatment methods for house fly control in dairy barns have been developed by Cornell University, according to David Pimental, of Cornell's entomology department, who reported the work performed by himself and Dr. H. H. Schwardt. In their experiments, Pimental said, neither sanitation alone nor the application of insecticide alone was as effective as a combination of both.

To avoid contamination of milk, two methods of treatment were successful. In one, called the strip treatment, ¾" wide strips of galvanized fly screen were dipped into emulsifiable concentrates of various insecticides and then tacked in place along the length of the ceiling of the barn at one-foot intervals, with the strips hanging down three to four inches. Best results from this method were obtained when strips were dipped into 15% dieldrin concentration, .2 lbs of toxicant per barn, which gave an average control of 16 weeks.

The second method employed a spot treatment technique. A restricted area of the barn was treated with higher concentrations of the insecticide so that the same total amount of insecticide was applied in the restricted area as would be applied in the whole barn with a normal over-all treatment. Eight pounds of dieldrin per 100 gals. of finished pesticide, .4 lbs. of toxicant per barn, gave slightly better than ten weeks control.

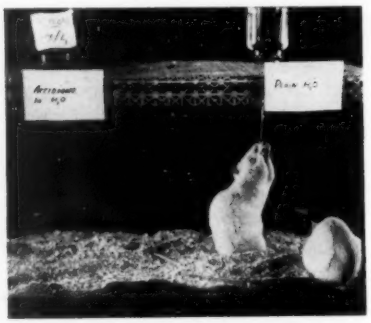
These two methods of fly control, Pimental reported, have not been issued as recommendations so far, but are merely presented as the results of experiments conducted.

Toxicity Responsibilities

Even though manufacturers of basic insecticidal chemicals have a responsibility to prevent the misuse of their product, regardless of how thoroughly they exercise this responsibility and how carefully they limit recommendations, they cannot control the use of a product by the purchasers. Expressing this opinion before the Tuesday morning joint aerosol and insecticide division meeting, R. B. Stoddard, U. S. Industrial Chemicals, said "three perfectly natural factors" have contributed to present existence of toxicity problems. Manufacturers of basic chemicals have been eager to expand their use into as many fields as possible and, in some cases, have ignored the question of possible hazards to users. Manufacturers of finished insecticides have been equally eager to incorporate the latest and most potent insect killers in their formulations to capitalize on the popular interest. But industry is not all to blame, Stoddard observed. "To a large degree at least, the haste and over-enthusiasm of industry have been promoted and encouraged by official statements and recommendations emanating from various Federal and state agencies' interest in the subject."

It costs somewhere between $25,000 and $75,000 and as much as two years' time to obtain complete toxicological data on a basic chemical. "Such complete data is absolutely necessary if a chemical is to be used under such conditions where human beings or animals are liable to be subject to continuing small dosages," Stoddard reported. He said the only practical approach to the problem is that we must know more about the products we are using, their hazards and limitations, and we must adjust our use of them accordingly.

Concurrent with divisional meetings of the insecticide group throughout the two-day convention, four other CSMA divisions were holding concentrated sessions. They are (1) aerosol; (2) disinfectant and sanitizers; (3) soap, detergent and sanitary chemicals; and (4) waxes and floor finishes divisions. By the close of the meeting, paid registration numbered 450 and there were approximately 60 guests. Dr. Hamilton announced that in 1953, the association will celebrate its 40th anniversary in Washington, D. C.



Lab. rats prefer plain water to water containing tiny amounts of actidione.

Actidione New Rat Repellent

A by-product of streptomycin called actidione has been found to be effective as a rodent repellent, according to Major Robert Traub of the Army Medical Center, Washington, D. C. .

Tests conducted by Maj. Traub revealed rats would refuse to drink water or eat food containing the drug after an initial taste. An injection of the highly irritating and toxic drug was fatal to laboratory rats.

On the basis of these results, it is assumed that actidione may be effective in use on cartons and other protective barriers to prevent gnawing attacks. Tests were conducted using dual-treated barriers, one portion being treated with 0.05 grams of actidione per sq. inch and the other portion with 0.1 grams sodium silicate per sq. inch. After 101 hours of continuous exposure to attack, the actidione-treated portion was damaged only slightly but rat penetration through the portion treated with sodium silicate was extensive.

Further experiments showed rats avoided actidione-treated barriers after initial contact and there was no evidence of reattack during subsequent exposure periods. More study may indicate methods that will eliminate the danger involved in using this drug because of its toxicity.

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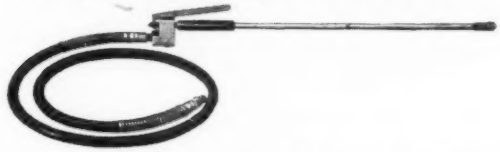

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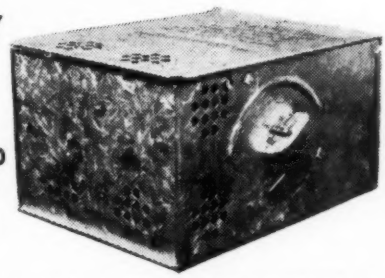

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- **Without Bait or Poison**
- **Ideal for service work — Particularly in Food & Baking Co.'s • Sanitary • Ruggedly Built**

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What Is An Insect?*

There are more different kinds of insects than all other animals combined. If you learned 25 new names of insects each day it would take 73 years to learn them all. But, if you learn to classify an insect, for example, as a beetle or an ant or a mosquito wriggler you immediately know certain things about it. So let's begin at the beginning and learn what an insect is.

A typical insect has jointed legs and an external skeleton broken up into an armour of rings and plates. It differs from other animals of this same general type by having six legs.

How it moves:

Insects walk with their jointed legs. They fly with special structures which are not made over out of one pair of legs like those of birds and bats. Insect wings are special movable outgrowths of the body wall.

How it sees:

The compounded eyes of insects are made up of thousands of separate eyes, like a bundle of six-sided pencils. The separate lenses form a surface like the six-sided tiles of a floor. Each of these small eyes "sees" the area directly in front of it and the insect receives all of these separate images as a mosaic.

How it eats:

Insects made over their mouthparts from primitive legs of the original segments that are now fused to form the capsule-like head. Some of the cockroach's mouthparts still resemble a walking leg, but all resemblance has been lost in the long tube-like mouthparts of the mosquito. Some, like termites and roaches, have *chewing* mouthparts; others —including mosquitoes — have *piercing - sucking* mouthparts; and there are some with *rasping-sucking* (thrips); *chewing-lapping* (wasps); and *sponging-type* (houseflies) mouthparts.

(Continued on page 42)

Characteristics of Insects and their near Relatives

	Body Divisions	Antennae	Legs
Sow bugs, crayfish	Head and body	2 pairs (1 small)	7 pairs
Millipedes	Head and body	1 pair	2 pairs on most body segments
Centipedes	Head and body	1 pair	1 pair on each body segment
Spiders, ticks, scorpions, mites	Head-thorax and abdomen or none	None	4 pairs on head-thorax
Insects	Head, thorax and abdomen	1 pair	3 pairs on thorax

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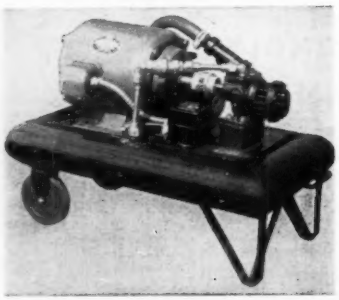

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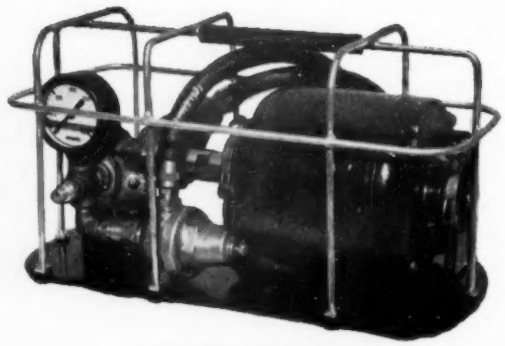

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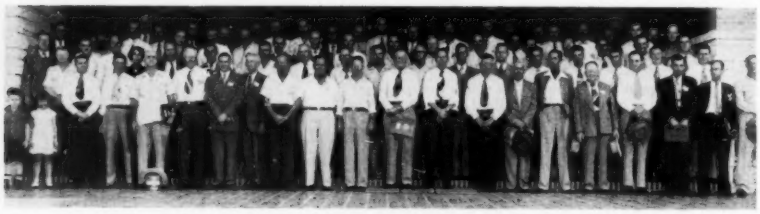
ORGANIZATION NEWS



Group picture taken at last Texas PCA Annual Study Day.

Texas PCA Talks Ants, Scorpions

Informative papers on ants and scorpions were presented on the Fourth Annual Pest Control Study Day held by the Texas Pest Control Association at A & M College in Bryan early last fall. Approximately 80 PCOs and guests attended the meeting.

Principal speakers were E. W. Jackson, an A & M graduate student who spoke on the identification of house ants; Dr. W. A. Little, A & M College, who discussed the biology and habits of Pharaoh and Thief ants; and Dr. Dial F. Martin whose paper covered the biology and control of scorpions. Carl Abel and W. N. Corley of Dallas presented to the group instructions for building an electric powder blower from a vacuum cleaner motor. The concluding paper, on dieldrin, was given by C. E. King, another graduate student.

Stucker Stays N. J. PCA Prexy

Harry Stucker, president of the United Chemical & Exterminating Co. of Jersey City, N. J., was re-elected president of the New Jersey Pest Control Association at the group's annual meeting at Rutgers University, November 15.

Mr. Stucker is vice-president of the Jersey City Lions Club and secretary of the Hudson County Chapter, National Foundation for Infantile Paralysis.

Other elected officers were: vice-presidents, William McHenry, and Harold Kutakoff; secretary, Sol Jordan; and, treasurer, Bernard Weening. Directors include: William Waack, Walter Roberts, Walter Boyce, Joseph Geisman, J. Arthur Jones and Harold Krauss.

13 Suppliers at N.E., Conn. Meet

Thirteen manufacturers of pest control supplies and machinery exhibited and demonstrated their equipment at the "Suppliers' Night" program given during the annual joint meeting of the New England and Connecticut pest control associations at Hotel Sheraton, Worcester, Mass., November 16, 1950. The program, which followed a chicken dinner in the hotel's Crystal Room, was presided over by Kenneth N. Cook and George W. Dyar, presidents of the N. E. PCA and Conn. PCA, respectively. Attendance was exactly 80.

Besides the suppliers' demonstrations, side meetings and an all-afternoon conference on NPCA convention plans for 1951 completed the day's activities. J. Edwin Sameth, NPCA president, and William O. Buettner, executive secretary, discussed association matters, particularly the manpower situation.

NPCA Convention chairmen for 1951 were announced as follows: local, Charles W. Houghton; general, Bartlett W. Eldredge; and for the ladies, Mrs. B. W. (Eunice) Eldredge.

Okla. PCA Plans Short Course

A three-day short course will be held by the Oklahoma Pest Control Association at the Department of Entomology, Oklahoma A. & M. College in Stillwater, February 1-3. PCOs from out of state are welcome.

Plans are being made by the association and A. & M. College to make this short course an annual affair. William O. Buettner, NPCA Executive Secretary, is scheduled to be present.

More information can be secured from Dr. F. A. Fenton of Oklahoma A. & M. or from J. Earl Griffin, Oklahoma PCA secretary-treasurer, P. O. Box 176, Tulsa, Okla.

CALENDAR OF MEETINGS

Northwestern Weed Control Conference, Hotel New Yorker, New York City, Jan. 3-5.

Louisiana Insect Control Conference, Louisiana State University, Baton Rouge, Jan. 9, 10.

Second Plant Maintenance Show and Conference, Public Auditorium, Cleveland, Ohio, Jan. 15-18.

Louisiana Pest Control Operators 11th Annual Conference, University of Louisiana, Baton Rouge, Jan. 29-31.

Eastern Pest Control Operators 11th Annual Conference, University of Massachusetts, Amherst, Feb. 1-3.

Oklahoma Pest Control Ass'n. Short Course, Oklahoma A & M College, Department of Entomology, Stillwater, Feb. 1-3.

Purdue 15th Annual Pest Control Operators Conference, Purdue University, Lafayette, Ind., Feb. 5-9.

American Association of Economic Entomologists Meeting, Cotton States Branch, Memphis, Tenn., Feb. 5-7.

National Canners Assn. Annual Convention, Chicago, Ill., Feb. 18-23.

California PCO Annual Convention, Mission Inn, Riverside, Jan. 25-27.

Pacific Northwest PCO Regional Conference, Oregon State College, Corvallis, March 5-7.

Pennsylvania 5th Annual Short Course, Pennsylvania State College, State College, Pa., March 7-9.

Alabama Pest Control Ass'n. Meeting, Montgomery, March 9, 10.

North Central States Entomologists Meeting, Commodore Perry Hotel, Toledo, Ohio, March 21, 22.

Canadian Pest Control Ass'n. 9th Annual Conference, Ontario Agricultural College, Guelph, May 7-9.

National Restaurant Show, Navy Pier, Chicago, Ill., May 7-11.

National Sanitary Supply Ass'n Conference, Hotel Hollenden, Cleveland, Ohio, June 3-6.

National Pest Control Ass'n 19th Annual Convention, Hotel Statler, Boston, Mass., Oct. 29-31.

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PEST CONTROL

notebook

By Douglas Katos

•

ABCs OF SAFETY

When the editor told me January was to be devoted to "Safety" he said, "Why don't you write on the ABCs of safety? It sounded easy at first, but when it came to deciding which precautions would represent the letters of the alphabet, I started to lose more of my hair which is getting pretty sparse anyway. Below is the list I decided upon, a list which may help you keep a perfect safety record.

A—Antidotes. Know them for the chemicals you use and keep a list mounted in the service truck for quick reference in cases of emergency.

B—Bait stations. Use them with 1080 and other toxic rodenticides. Be sure they're locked and out of a child's reach.

C—Caution statements are on labels of most of the insecticides you use. Read and heed them.

D—Doctor. Keep the name, address and telephone number of a reliable doctor pasted inside your truck, as well as in your wallet.

E—Emetics empty the stomach. Salt water and soapy water are emetics. Know what they are and when they're to be used.

F—Flash point. Know the flash points for each of the formulations you use to avoid serious explosions and fire accidents.

G—Gas. Make sure all gas jets are turned off when using space sprays and fogs. When gassing or fumigating, wear the proper protection equipment. Learn to detect gas odors.

H—Halide detector. Every fumigator using methyl bromide should have one.

I—Irritants. If your skin is allergic to some pesticides, wear protective clothing, gloves, dermal creams, etc. Keep covered when there is danger of contact.

J—Judgment. Follow directions, but if none are available, use common sense and good judgment. Don't take chances. Play it safe.

K—Kerosene, so commonly used and accepted that often safety precautions are overlooked or disregarded. It is toxic, volatile and highly inflammable.

L—Label all of your containers. Many poisons have been mistaken for edibles because they were in unlabeled containers. Death usually results.

M—Maintenance. Keep equipment in good working order to avoid accidents.

N—Noxious gases. Do not leave your truck running in the shop or garage with all the doors and windows closed..

O—Oxygen. Be sure to have a supply of self-contained breathing apparatuses if you work in oxygen deficient or highly contaminated atmospheres. Air is about 1/5 oxygen. A little less and you pass out; much less and you die!

P—Phosphorous paste should not be diluted with water. It is extremely dangerous..

Q—Quasi-authenticated claims for pesticides can be disastrous. Deal only with reputable suppliers upon whose word you can depend.

R—Rodents carry diseases. Don't pick them up with your bare hands.

S—Safety equipment. Be personally safety-conscious at all times.

T—Test before you apply. Test surface space sprays to see if damage will result.

U—Unknowns. Don't experiment with them on the job. If you are not sure what it is, have it tested. Let those trained to find out, do it.

V—Ventilation is an important part of every indoor job. Be sure there is plenty of it ready to use at the proper time.

W—Water. Remember that water based sprays, solutions or emulsions may cause staining or warping. Take a test sampling first.

X—Xylene solvent fumes are inflammable and breathing them may cause sickness.

Y—Year in and year out practice safety — with your chemicals, how you work, and for those with whom you come in contact.

Z—Zero. Watch out for freezing temperatures, whether absolute or Fahrenheit. Know the freezing point of the materials you use.

Huberman New PEA Prexy

Jacob L. Huberman of Scientific Exterminating Co., New York City, was elected president of Professional Exterminators Association, Inc. at its meeting held November 13 in the American Museum of Natural History. He had been serving as vice-president up to that time.

David Cantor, Bell Exterminating Co., New York City, was elected vice-president; William Farrell, Effective Exterminating Co., Brooklyn, treasurer; and, Philip W. Friedman, Sanex Exterminating Co., Brooklyn, secretary.

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PATENTS

RELATING TO PEST CONTROL

BY

DR. R. C. ROARK

U. S. Department of Agriculture

Copies of all patents can be obtained for 25 cents (no postage) sent to the Patent Office, Washington D. C. In ordering a copy of a patent the number of the patent, the date, the name of the patentee, and the subject of the invention should be stated.

2,496,393 (Feb. 7, 1950; appl. Nov. 16, 1946). **MOUSE AND RAT TRAP.** William J. Hayden, Byrn Mawr, Pa.

2,496,415 (Feb. 7, 1950; appl. April 9, 1947). **FLY SWATTER.** William W. Sharpe, Detroit, Mich.

2,496,769 (Feb. 7, 1950; appl. Jan. 16, 1947). **PROTECTING DEVICE AGAINST RAIN, SUN, FLIES, AND THE LIKE.** Turner R. Battle, Philadelphia, Pa.—This umbrella type device is designed to be secured on the body of a person.

2,497,101 (Feb. 14, 1950; appl. June 29, 1945). **METHOD OF SPRAYING** Donald F. Starr, College Park, Md.—A method of depositing DDT comprises forming a water spray, independently thereof forming a spray of a solution of DDT, and intermixing the sprays, thus causing the DDT solution to be dispersed throughout the droplets of water immediately prior to depositing of the spray.

2,497,294 (Feb. 14, 1950; appl. Oct. 15, 1946). **INSECTICIDAL COMPOSITION.** Leonard C. Cartwright, New York, N.Y. — Foster D. Snell, Inc.—A liquid composition suitable for use in forming a hard non-tacky insecticidal film comprises DDT, ethyl cellulose, a coumarone-indene resin, and a volatile solvent medium for the insecticide, hardening agent and resin, proportions by weight of the non-volatile ingredients being 0.5 part to 2.5 parts of the resin, 0.1 to 0.5 part of the cellulose ether and 5 parts of the insecticide.

2,499,021 (Feb. 28, 1950; appl. Feb. 6, 1947). **SPRAY NOZZLE.** Lynn Fletcher, Lowell, Mich. — Specialty Company, Lowell, Mich.

2,499,396 (March 7, 1950; appl. Aug. 13, 1945). **PARASITICIDAL SYNERGISTIC** COMPOSITION OF BENZENE HEXACHLORIDE AND 2,4-DINITRO-PHENOLS. George E. Lynn, Midland, Mich. — The Dow Chemical Company, Midland, Mich.—A parasiticidal composition includes as active toxicants benzene hexachloride and one of the group consisting of the hydrocarbon-substituted 2,4-dinitro-phenols and their salts, and wherein the mixture of toxicants exerts a synergistic effect as regards parasiticidal toxicity

2,499,648 (March 7, 1950; appl. Sept. 27, 1947). DINITROHEXACHLOROBUTANES. George John Janz, London, England — Canadian Industries Limited, Montreal, Quebec, Canada.—These compounds are made by reacting the dimers of trichloroethylene with nitrogen tetroxide in a closed system at a temperature of about 80° C. for a period of three to six hours. The dinitrohexachlorobutanes possess good fungicidal properties and they are particularly suitable for soil fumigating purposes.

2,500,816 (March 14, 1950; appl. Sept. 10, 1947). **COMBINED CLEANING AND INSECTICIDE APPARATUS.** John A. Gird, Ilion, N. Y.—This machine is capable of performing the cleaning, spraying and dusting of walls and/or equipment about a dairy barn.

2,500,961 (March 21, 1950; appl. Nov. 20, 1944). **METHOD OF PRODUCTION OF DDT.** Walter H. C. Rueggeberg and Walter A. Cook, United States Army—The patentees claim in the reaction of the member of the group consisting of anhydrous chloral and chloral hydrate with two mols of chloral benzene to form 2,2-bis (p-chlorophenyl) 1,1,1-trichloroethane, the improvement which consists in carrying out the reaction in the presence of a stoichiometric amount of chlorosulfonic acid.

2,501,043 (March 21, 1950; appl. Sept. 2, 1943). **RATTRAP.** Savino R. Giacoletto, San Francisco, Calif.

2,501,191 (March 21, 1950; appl. July 31, 1945). **N,N'-POLYTHIOAMINES AS PESTICIDES.** William D. Stewart and John H. Standen, Yonkers, N.Y. — The B. F. Goodrich Company, New York, N. Y.—A pesticidal composition comprises as the essential active ingredient 10 parts per million to 0.25% by weight of N,N'-dithiodibutylamine homogeneously dispersed in an aqueous solution of a dispersing agent.

2,501,490 (March 21, 1950; appl. May 21, 1948). **RODENT TRAP.** Clifford Osmon Back, Safford, Ariz.

2,501,651 (March 28, 1950; appl. Sept. 1, 1948). METHOD OF PRODUCING ACRYLONITRILE. Joseph F. Martino, Elizabeth, N. Y. — American Cyanamid Company, New York, N. Y.

2,501,697 (March 28, 1950; appl. Jan. 25, 1947). DICYCLOPENTADIENE DITHIOCYANATE. Eldon S. Stahly, Pittsburgh, Pa.—Koppers Company, Inc., Pittsburgh, Pa.—This compound is useful as an active ingredient in insecticidal compositions.

2,502,366 (March 28, 1950; appl. May 15, 1946). **INSECTICIDE BASE OIL TOXICANT.** Warren A. Beman, Albany, and Robert B. Killingsworth and Arthur C. Pabst, Douglaston, N. Y.—Socony-Vacuum Oil Company, Inc.—An oil, toxic to mealy-bugs but harmless to plants consists of about 45 to 70 weight percent of C12 isoparaffinic and paraffinic hydrocarbons and the balance substantially all lighter and heavier isoparaffins and paraffins, and being substantially devoid of aromatic and naphthenic hydrocarbons.

PESTALES

Alcoholics Unanimous

One of Hackensack, N. J.'s citizens, who prefers to remain nameless, tried to rid his roof of pesky pigeons by feeding them a diet of grain soaked in liquor. The birds enjoyed the repast and left the premises on unsteady wings.

The next day, however, the pigeons were back — their ranks doubled by relatives and chance acquaintances—all intent on another feast. Mr. Homeowner was unhappy, to say the least, and had to seek help from city authorities, who obtained for him permission to buy pure alcohol, an alleged dove dispenser. When informed the price was about $18.50 a gallon, tax included, the taxpayer wrung his hands (his pocketbook was dry) and headed for home. At last report he had found another use for his liquor.

* * *

Rents Snakes by the Foot

Harry Kemp of Sydney, Australia, started a snake rental service recently. For 40 years, Harry has sold snakes for $4 each to catch rats in warehouses. Now he is renting them out at so much a foot. His first snake rental was a four-foot reptile to a large store.

* * *

Rats Are Upper Crust

The "lady" from the "big house," very much class-conscious, was calling on the "lady" of the "little house".

"We are troubled with rats at home," she said. "I suppose you are similarly bothered with mice."

* * * *

One Too Many

James L. Garrison of Moulton, Ala., owes his life to a rat. While washing the family car he was bitten by a rattlesnake. Nothing happened and doctors found no poison in his system. A veterinarian examined the snake and found it had swallowed a rat shortly before and had used up, temporarily, its supply of poison.

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Primer

(from page 36)

And how they breathe:

Instead of the roundabout method of breathing through the nose to the lungs and then, by way of the blood, to various parts of the body, insects carry their air directly to the body tissues by means of fine tubes. These microscopic tubes (Trachae) open through body wall openings (Spiracles) and extend by fine branches (Tracheoles) to all parts of the body.

That's all for now. Next month we'll cover how insects grow and then compare characteristics of important household pests.

*Based on information prepared by R. L. Usinger at the University of California.

Maguire Heads New Eng. PCA

Edward C. Maguire, Haverhill, Mass., has been elected president of the New England Pest Control Association for 1951. Other new officers slated to serve during the coming year are: W. J. Mongeau, vice-president; Bartlett W. Eldredge, treasurer; and Leonard Y. Goldman, secretary.

OBITUARIES

Mrs. Claude Favreau

Word arrives from the Canadian Pest Control Association that the wife of Claude Favreau passed away November 19 at Montreal, Quebec, following a lengthy illness. She was 46.

Mr. Favreau operates Protex Corporation of Canada, Ltd., in Montreal and is a member of the Canadian PCA.

Guy Raymond Lovejoy

Law enforcement officials at Malibu station, California, listed as probable suicide the cause for death of Guy Raymond Lovejoy, 50, whose body was found in a field near his home November 29th. It was believed that Mr. Lovejoy used termite extermination gas to take his own life.

Since 1928, Ray Lovejoy had been an active partner in the Western Exterminator Co., Los Angeles. During the last 25 to 30 years, he was a reader in the Christian Science church. Mrs. Lovejoy and two sons, Carl and Dick, survive him.

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because they save money!

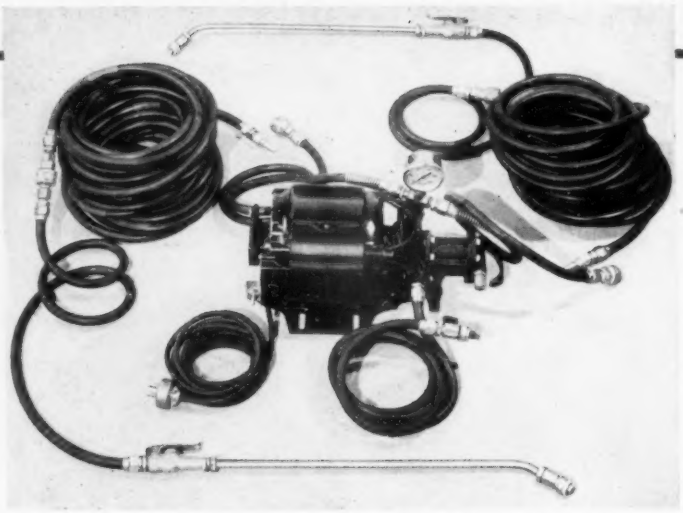
ELECTRIC RESIDUAL APPLICATOR

● For use in warehouses, factories, hotels, theatres, outdoors for lawns, weeds, shrubs, small trees . . . for such jobs as flies, carpet beetles, large roach jobs, etc., moth-proofing and flame-proofing. Termite work.

High-precision gear pump, strain-free motor; oil, water and chemical resistant stainless steel driving gear. Driven gear of self-lubricating plastic. Quiet operation.

Outfit includes 100 ft. PCE oil-resistant hose; 18" aluminum extension; leakproof valve; set of 3 different capacity fan pattern nozzles; 6' Underwriters' Approved Neoprene oil-resistant cord; 6' intake hose with strainer; 6' return line; 200 lb. pressure gauge; 110 V 60 cycle AC motor (DC available); renewable hose end adapters and two sets of snap-on hose couplers.

ALL COMPLETE FOR ONE MAN OPERATION.
PRICES WILL BE FURNISHED ON REQUEST.



ELECTRIC RESIDUAL APPLICATOR

HELPS YOU LICK YOUR COST PROBLEMS!

STAINLESS STEEL TANK TYPE SPRAYER

● A 2¾ gallon stainless steel unit that is built for service! Economical and efficient in operation. CHECK THESE FEATURES: All mechanical seals — no soldered inlets — leak-proof valve gives clean shut-off — has Koroseal washer — accurate pressure gauge with unbreakable crystal — stainless steel 2¾ gal. tank and pump by Hudson. Renewable hose end adapters — 5 ft. ¼" I.D. PCE oil-resistant hose — 18" PCE aluminum extension — fan pattern spray nozzle — Knapsack type web strap.

PRICES WILL BE FURNISHED ON REQUEST.

THE BEST SPRAYER YOU'VE EVER SEEN!

2 QT. RESIDUAL APPLICATOR

● Here's a lot of sprayer for the money. Chrome finished all brass tank. Easy to clean. Professional in appearance. Has top-mounted easy-to-read pressure gauge with unbreakable crystal. Easy top fill. Check valve prevents dripping or accidental discharge when extension is removed. No soldered inlets. ALL MECHANICAL SEALS WITH LIFETIME KOROSEAL GASKETS. Can be operated with one hand.

PRICES WILL BE FURNISHED ON REQUEST.

Write for our catalog

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